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AIR QUALITY MANAGEMENT DISTRICT



1993
Air Quality Handbook

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

939 Ellis Street, San Francisco, California 94109

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AIR QUALITY HANDBOOK**

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NINE COUNTY JURISDICTION OF THE BAAQMD



Air pollution is older than the human race. In fact, its origins date back to the birth of our planet when erupting volcanoes blackened skies with countless tons of cinders and ash.

Today, we still experience air pollution from volcanoes, as well as from other natural sources such as dust storms, salt spray, and forest fires sparked by lightning. Even trees and other vegetation emit a sizeable amount of smog-forming organic emissions. Additionally they release many varieties of pollens and spores into the air, which can adversely affect the health of sensitive persons.

Air pollution is generally counterbalanced by the atmosphere's natural cleansing action. Dusts drift, cluster and gradually settle or are rained out of the sky; gases may naturally convert to less harmful forms or oxidize and become attached to particles.

When humans entered the picture, the natural balance was disturbed. From the smoke of the earliest campfires to the vast array of emissions associated with modern civilization, population growth and urban development have been paralleled by an increase in the type and quantity of airborne wastes.

Ancient Rome experienced air pollution, as did Medieval London, which faced serious air quality problems as the fuel demands of a growing population forced a conversion from wood burning to coal burning. London's famous "pea-soup" fogs first appeared with the introduction of coal.

The arrival of the Industrial Revolution in the nineteenth-century greatly accelerated growth of all types of environmental pollution. This trend has leveled off in the United States and parts of Western Europe but continues today in most of the rest of the world, especially in areas where pollution controls are nonexistent.

Air pollution is but one of the many kinds of waste created by people living close together in an industrialized society. From the time we awake to the time we go to bed, much of what we do causes air pollution. We get up in the morning and turn on the lights, probably unaware that most of the electricity we use has been generated by the burning of fuel—a process which creates air pollution. Hot showers and hot meals require the combustion of fuels, as does running an automobile. Millions of us use our cars to drive to work each day or to run errands, making automobiles the largest contributor to the Bay Area's air pollutant mix.

Many of the products we use—clothing, appliances and consumer goods ranging from lipsticks to plastic containers—were produced at the

cost of air pollution. Many were smelted, heated, abraded, ground, polished, sanded, or welded—all processes which contribute to air pollution.

Over one hundred types of air pollutants exist, each having different effects depending on their concentration. Air pollutants are usually divided into two classes—particulate matter (either solid or liquid) and pollutant gases.

PARTICULATE MATTER

Dust, mist, ash, smoke and fumes are some of the liquid or solid particles found in the atmosphere. In many parts of the world, natural particles like dust and pollens are the principal source of air pollution; in industrialized regions, particulate emissions caused by human activities predominate.

Smoke, composed of carbon and other products of incomplete combustion, is the most obvious form of particulate pollution. Open fires, incinerators, petroleum refining, and fuel burning in vehicles and aircraft all produce these highly visible particulates.

Industrial processes such as those used in refining crude oil and in manufacturing chemicals also contribute to particulate formation. Liquid aerosols and solid particles form photochemically in the atmosphere when sunlight reacts with waste gases. When metals are melted, the heated material emits fumes which may condense to form metallic oxides in the atmosphere. Industrial dust is formed by grinding or pulverizing materials, as in cement production. Earth-moving operations, especially farming and construction, also cause large amounts of dust to enter into the air.

Some particulate emissions are considered more toxic than others. Highly toxic substances such as cadmium, beryllium, and asbestos are associated with specific industries and are of greatest concern in the immediate vicinity of the source.

GASES

Because of their effects, some gases produced by industries or automobiles or formed in the atmosphere are regarded as air contaminants. The most important of these are reactive organic compounds, carbon monoxide, oxides of nitrogen, sulfur oxides, hydrogen sulfide and ozone. All can cause discomfort and illness in persons exposed for various time periods at varying concentrations, and some organic compounds can impair visibility or damage plant life.

Organic Compounds. Organic gases, or hydrocarbons, are created when fuels or organic waste materials are burned. These materials are the result of incomplete combustion and range in complexity from methane, a simple

organic gas, to much more complex molecules containing carbon, hydrogen and oxygen in varying proportions. Organic compounds are also emitted by consumer products such as aerosol sprays and by paints, inks, solvents, and gasoline when they evaporate.

Organic compounds are significant air pollutants because they react with oxides of nitrogen in the presence of sunlight to produce photochemical smog, or ozone. In addition, over 50% of the public's total exposure to toxic air contaminants in the Bay Area comes from two organic compounds found in automobile exhaust—benzene and 1,3-butadiene.

Carbon Monoxide (CO). This is an odorless, invisible gas which affects the health of people exposed to high concentrations. Carbon monoxide is especially dangerous indoors, when ventilation is inadequate.

Over 70% of the Bay Area's carbon monoxide comes from motor vehicles. A substantial amount also comes from burning wood in fireplaces and woodstoves. State and federal controls on new cars and voluntary efforts to reduce woodburning have been implemented to prevent carbon monoxide from reaching adverse levels. However, the Bay Area periodically exceeds the federal and state standards for carbon monoxide during the winter months.

Sulfur Oxides. Heating and burning "fossil fuels," like coal and oil, release the sulfur present in these materials. In areas where large quantities of fossil fuels are used, sulfur oxides can be a major air pollution problem. The largest fraction of sulfur oxides is sulfur dioxide (SO_2). This substance often further oxidizes to form sulfur trioxide (SO_3), which in the presence of moisture can form sulfuric acid mist (H_2SO_4). These contaminants can damage vegetation and affect the health of both humans and animals.

In the past, sulfur oxides were a problem in the Bay Area, especially in the vicinity of the large oil refineries and chemical plants in Contra Costa County. The Bay Area Air Quality Management District (the District) has been controlling emissions from these sources since 1961, however, and no state or federal excesses have been recorded at District monitoring stations since 1976.

Hydrogen Sulfide (H_2S). A colorless gas with a strong "rotten egg" odor, hydrogen sulfide (H_2S) can be smelled at very low concentrations. It discolors paints and tarnishes many metals. This gas is produced largely at sewage treatment plants and at oil refineries as a by-product in refining crude oil. Concentrations of H_2S are limited by District regulations.

Oxides of Nitrogen. Air is comprised of about 80% nitrogen. Whenever anything burns at high enough temperatures a certain amount of nitrogen in the air burns as well. Burning, also known as oxidation, occurs when material combines with oxygen in such a way as to release energy in the form

of light and heat. The resulting compounds containing nitrogen are primarily nitric oxide (NO) and nitrogen dioxide (NO₂). Mixtures of these two compounds are known as oxides of nitrogen and they are involved in photochemical reactions that produce ozone.

At concentrations experienced in the Bay Area nitrogen dioxide can be seen as a “whiskey brown” haze. On days with otherwise good visibility, the coloration effects will be noticeable. At higher concentrations, damage has been noticed in sensitive crops such as beans, tomatoes, and tobacco, and pulmonary changes have been observed in laboratory animals.

Over half of the nitrogen oxides in the Bay Area are produced by automobile exhaust. The Environmental Protection Agency (EPA), California's Air Resources Board (ARB) and the District have all adopted measures to curtail emissions of nitrogen oxides. The District directly controls certain non-vehicular sources of these pollutants, and indirectly controls vehicular sources of NO_x by working to change people's driving habits.

ACID DEPOSITION

In recent years, “acid rain” has come to be recognized as a major environmental problem. The precipitation of acidic water as rain, snow, and dew is related to air pollution because the sulfuric and nitric acids that contaminate atmospheric moisture are generated from the combustion of fossil fuels.

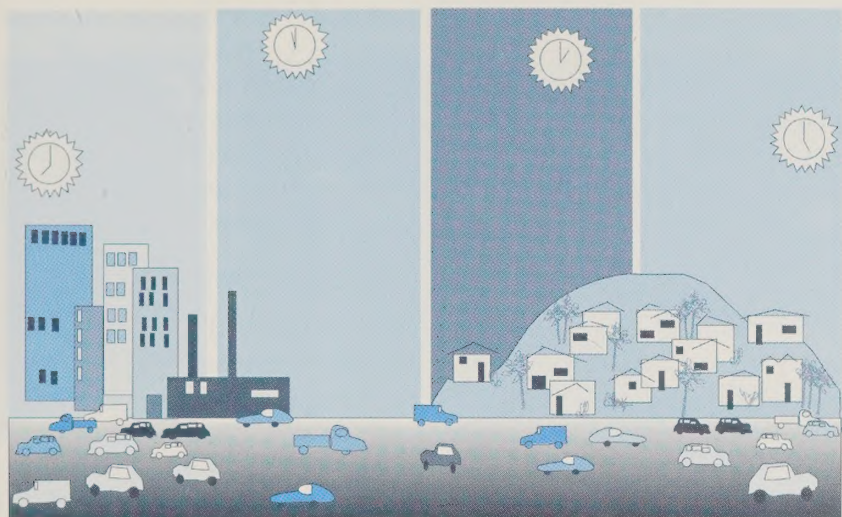
Complex chemical changes take place when sulfur oxides (emitted from sources such as power plants) and nitrogen oxides are transported in the air many miles from their points of origin. Over a period of three to five days, the materials are converted to their acid forms and precipitated from the atmosphere. In Canada and Scandinavia, it has been shown that acidic rainfall has resulted in “aquatic death” for many small lakes.

Since the emission of sulfur oxides is considerably lower in California than in other parts of the world, the primary source of acid rainfall is nitric acid resulting from automobile emissions. Measurements in California have shown periods of acidic rain in the initial stages of storms, but thus far no significant long-range transport to the vulnerable mountain lakes has been observed.

PHOTOCHEMICAL SMOG — OZONE

Photochemical air pollution—or photochemical smog—results from a chemical reaction which takes place in the atmosphere between NO₂ and reactive organic gases under the photochemical influence of sunlight. Various factors affect this process, including the quantity of gases present, the volume of air available for dilution, the temperature, and the intensity of the ultraviolet light. Ideal conditions occur in the summer and early fall

A Day in the Life of Ozone



EARLY MORNING

The formation of ground-level ozone gets started early in the morning. As we begin the day's activities, practically everything we do, from plugging in the toaster to driving our cars to work, generates ozone-forming air pollution. The most significant of these ozone "precursors" are reactive hydrocarbons and nitrogen oxides. Vehicular traffic is by far their largest source.

LATE MORNING

Although the morning commute is over, continued traffic emissions added to the earlier pollution begins to form ozone as the sun's heat and light intensifies. During warm summer months, an inversion may develop which traps the pollutants close to the ground (400-500 feet above sea level). If there is little wind, the pollution dispersion may be further restricted.

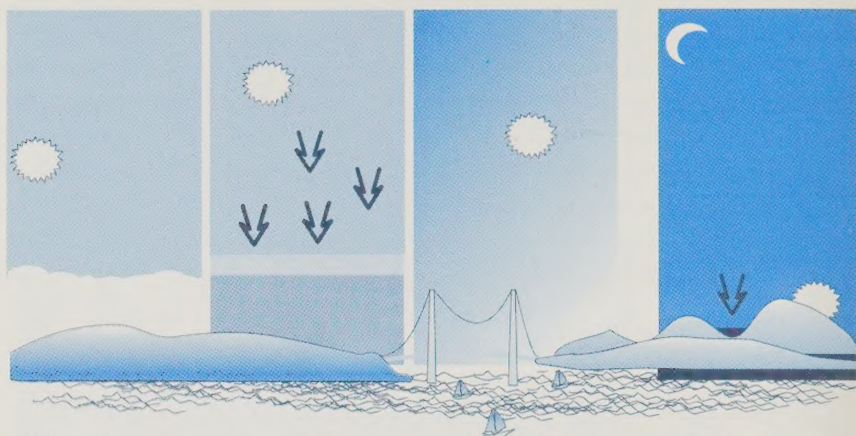
MID-AFTERNOON

By mid-afternoon, the sun has reached its apex and temperatures peak. The sun's radiation will cause a chemical reaction between the reactive hydrocarbons and nitrogen oxides to form ozone. Temperatures in the 90's or above are required for maximum ozone concentrations.

LATE AFTERNOON

As the intensity of the sunlight decreases, the photochemical production process also decreases. By late afternoon, most of the ozone formed during the day breaks down into other compounds, and by early evening the ground-level ozone is essentially destroyed.

How Weather Affects Air Quality



When fog or clouds cover the Bay Area, much of the sun's light and heat are filtered out of the lower-level atmosphere. Under these conditions, there is minimal photochemical reaction and air quality is generally good.

When the weather is warm and the winds are light, a vertical downward motion of air and a natural cooling of the earth's surface act together to form an inversion that traps pollutants. Sunlight then causes a chemical reaction between the hydrocarbons and nitrogen oxides — to form ozone.

On summer days when there is a strong ocean breeze, surface inversions are rare and air pollutants are easily dispersed. The topography of San Francisco Bay allows this natural ventilation to keep the primary basin's air clean, although some pollutants may be transported to inland valleys.

On cold, still winter evenings, the earth's surface loses the heat it has absorbed from the sun, cooling the air near the surface. Inversions form when the surface temperature becomes colder than the air above. These inversions trap pollutants — predominantly carbon monoxide and visible particulates — close to the ground.

on warm, windless, sunny days. The major effects of photochemical smog are aggravation of respiratory diseases, eye irritation, visibility reduction and vegetation damage. The largest fraction of photochemical smog is ozone.

The greatest source of smog-producing gases is the automobile. In the Bay Area, more than 50% of the reactive organic gases and nitrogen oxides comes from cars and trucks. California's automobile control program together with the District's regulatory controls have already succeeded in making a substantial reduction in these pollutants, with more progress expected as these controls become more stringent.

WEATHER AND TOPOGRAPHY

The San Francisco Bay Area is a large shallow basin surrounded by hills that tapers into a series of sheltered valleys, including the Santa Clara, Livermore, Diablo and Napa valleys. The topography alone gives the Bay Area air basin great potential for trapping and accumulating air pollutants. Within the basin, contaminants are emitted at a fairly constant rate throughout the year; however, weather conditions cause air pollution concentrations to fluctuate widely from day to day and season to season.

Global weather patterns strongly affect these local variations. When strong jet streams dominate the airflow above California, or when migratory storms bring rain and upward vertical flow, air pollutant concentrations are very low. When high pressure areas dominate California, resulting in light winds and downward vertical flow, air pollution builds up.

The amount of air available to dilute pollutants depends primarily on two factors—horizontal airflow and vertical mixing. Vertical mixing, a process where air masses rise upward and mix with surrounding air, is severely limited when a layer of warmer air lies above a layer of cooler air. This is a reversal of the atmosphere's normal decrease of temperature at higher altitude and is thus called an inversion layer. The strong inversions typical of California summers are caused by *subsidence*, a downward vertical motion that compresses and heats the air. The surface inversions typical of winter are formed primarily at night as air is cooled when it comes in contact with the earth's cold surface—these are called *radiation inversions*.

The important effect of a temperature inversion is that it prevents pollutants from rising and being diluted vertically. Thus, pollutants remain trapped in the layer of air where people breathe. Summer subsidence inversions occur on over 90% of summer days; they persist throughout the day and tend to intensify during the afternoon. Winter radiation inversions occur on over 70% of winter nights, but are usually destroyed by daytime heating, bringing a rapid improvement in air quality by afternoon. Both types of inversion mechanism may operate at any time of the year, however,

and in the fall both may occur together to produce our heaviest pollution potential.

The other major factor influencing pollutant dispersion is horizontal airflow. This is most simply measured by wind speed. For example, a 15 mph wind provides three times as much dilution as a 5 mph wind. However, wind direction must also be considered in areas where reversals are common. In sheltered valleys, for instance, air commonly flows up-valley during the day and reverses to drain down-valley at night. This recirculation compounds air quality problems because pollutants are able to drift back and forth beneath the inversion and persist at unacceptable levels.

The inversion and wind speed together determine the ventilation factor, which means simply the total volume of air available to dilute air contaminants. Bay Area ventilation is normally adequate to disperse most of our pollution. However, poor ventilation during the warm, sunny months fosters the development of photochemical ozone, creating a May-to-October ozone season. Other contaminants such as carbon monoxide and particulates reach their highest levels in late fall and winter.

POLLUTANT STANDARDS INDEX

The District reports daily air pollution information to the public using the Pollutant Standards Index (PSI). The PSI was developed by the EPA pursuant to the Clean Air Act amendments of 1977. The PSI standardizes air pollution reporting and allows air quality comparisons to be made between different geographic areas.

PSI Conversion Tables

Descriptors	PSI Range	Ozone 1 - Hr, ppm	Carbon Monoxide 8 - hr, ppm	*PM ₁₀ 24 - Hr, $\mu\text{g}/\text{m}^3$
GOOD	0 — 50	.00 — .06	.00 — 4.5	0 — 50
MODERATE	51 — 100	.07 — .12	4.6 — 9.0	51 — 150
UNHEALTHFUL	101 — 199	.13 — .19	9.1 — 14.9	151 — 349
VERY UNHEALTHFUL	200 — 299	.20 — .39	15.0 — 29.9	350 — 419
HAZARDOUS	300 & Above	.40 +	30.0 +	420 — 499

* PM₁₀ derived from site-specific and season-specific Coefficient of Haze (COH) values

The PSI converts air pollution concentrations to simple values ranging from zero to 500. For example, the federal ozone standard of .12 ppm for one hour translates into a PSI reading of 100 and an ozone concentration of .20 ppm (the criteria for a first stage alert) translates into a PSI reading of 200. Conversion tables exist for ozone, as well as nitrogen dioxide, sulfur dioxide, carbon monoxide, respirable particulates (PM₁₀), and coefficient of haze (COH). There are also conversion tables for SO₂ x COH.

PSI values are graded into levels, which are identified by descriptors relevant to human health. The index value of 100 was selected to correspond to the short-term (24 hours or less) National Ambient Air Quality Standard set by EPA to represent the concentration of a pollutant below which adverse health effects have not been observed.

For the purpose of reporting PSI values to the public, the Bay Area is divided into six sub-regions:

- **North Counties** (Napa, Solano and Sonoma counties)
- **Central Bay** (Marin and San Francisco counties, Oakland, Berkeley and Richmond)
- **East Contra Costa** (Walnut Creek, Martinez, Concord, Pittsburg and Antioch)
- **Livermore and Southern Alameda** (from San Leandro south to the county line, including the Livermore Valley)
- **Santa Clara Valley** (the Santa Clara Valley north to Sunnyvale)
- **Peninsula** (San Mateo County plus Palo Alto and Mountain View).

At 4:30 p.m., Monday through Saturday, the District reports the highest PSI value recorded in each of the six air quality zones and makes a forecast for the following day. On Monday mornings, forecasts are made at 10:00 a.m. The air quality readings are recorded on the District's 1-800-HELP-AIR line, and disseminated to local media via the wire services.

VOLUNTARY CURTAILMENT

In 1991, the District began a voluntary curtailment program, asking the public to reduce pollution-causing activities when the PSI is predicted to reach 80—approaching the unhealthful level. The summertime “Spare the Air” program requests that the public voluntarily curtail driving, painting, using aerosols, and operating gasoline-powered lawn mowers, utility equipment, and motorized recreational boats. In the winter, the District's “Don’t Light Tonight” advisories ask the public to refrain from burning wood in fireplaces and woodstoves, unless the equipment is EPA Phase II certified or equivalent. The voluntary curtailment programs seek the cooperation of the public in reducing pollution to prevent further deterioration in air quality.

Comparison of Federal and State Air Quality Standards

POLLUTANT Averaging Time	FEDERAL	STATE	OBJECTIVE
Ozone			
1-hour	0.12 ppm 240 $\mu\text{g}/\text{m}^3$	0.09 ppm 180 $\mu\text{g}/\text{m}^3$	To prevent eye irritation, breathing difficulties.
Carbon Monoxide			
8-hour	9.3 ppm 10 mg/m^3	9.0 ppm 10 mg/m^3	To prevent carboxyhemoglobin levels greater than 2%
1-hour	35 ppm 40 mg/m^3	20 ppm 23 mg/m^3	
Nitrogen Dioxide			
Annual	0.05 ppm 100 $\mu\text{g}/\text{m}^3$	—	To prevent health risk and improve visibility
1-hour	—	0.25 ppm 470 $\mu\text{g}/\text{m}^3$	
Sulfur Dioxide			
Annual	0.03 ppm 80 $\mu\text{g}/\text{m}^3$	—	To prevent increase in respiratory disease crop damage and odor problems
24-hour	0.14 ppm 365 $\mu\text{g}/\text{m}^3$	0.05 ppm 131 $\mu\text{g}/\text{m}^3$	
1-hour	—	0.25 ppm 655 $\mu\text{g}/\text{m}^3$	
Sulfates			
24-hour	—	25 $\mu\text{g}/\text{m}^3$	To improve visibility and prevent health effects
PM₁₀*			
Annual mean	50 $\mu\text{g}/\text{m}^3$	30 $\mu\text{g}/\text{m}^3$	To improve visibility and prevent health effects
24-hour average	150 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	
Visibility reducing particles	State Standard: One Observation. In sufficient amount to reduce the prevailing visibility to less than ten miles when the relative humidity is less than 70%.		
Lead			
30-day Calendar quarter	— 1.5 $\mu\text{g}/\text{m}^3$	1.5 $\mu\text{g}/\text{m}^3$ —	To prevent health problems
Hydrogen Sulfide			
1-hour	—	0.03 ppm 42 $\mu\text{g}/\text{m}^3$	To prevent odor problems
Vinyl Chloride (Chloroethene)			
24-hour	—	0.010 ppm 26 $\mu\text{g}/\text{m}^3$	To prevent health problems

* Particulate matter ten microns or less in size. The annual standards are based on an arithmetic mean for federal and a geometric mean for state.

VISIBILITY REDUCTION

The most obvious effect of air pollution is reduced visibility. Indeed, it is often the first sign of an air pollution problem. Visibility reduction is caused by the brownish haze of nitrogen dioxide and the accumulation of particulate matter in the atmosphere.

Visibility reduction is caused by the darkening effects of nitrogen dioxide and from the accumulation of particulate matter in the atmosphere. Visibility is affected by a number of factors which are well understood and others which are not. Basically, visibility reduction is caused by light-scattering of particles in the sub-micron (0.2 to 0.8 micron) range. By comparison, human hair varies from 30 to 130 microns. When these particles are present in sufficient quantities, distant objects become obscured. Sub-micron particles derive from five major sources:

- Particulate emissions from industrial, commercial, vehicular and other man-made sources.
- Particles or aerosols formed by photochemical reactions occurring in the atmosphere.
- Naturally occurring particles from salt water, vegetation, soil and wind erosion processes.
- Atmospheric particles, normally too small to affect visibility, which grow to visibility reducing size through the process of agglomeration (clustering).
- The presence of moisture in the atmosphere which can condense on to small particles, causing them to grow to visibility-reducing size.

Visibility in the Bay Area can range dramatically depending on meteorological conditions. The major factors causing these fluctuations are the amount of moisture in the air and the volume of air available for dilution and dispersion of all visibility reducing particles. Under adverse weather conditions some or all of the factors discussed above are maximized and visibility becomes very restricted.

During winter in the Bay Area, visibility reducing particles from photochemical activity are greatly diminished because of the colder temperatures and low intensity of ultraviolet light. Therefore, the formation of photochemical aerosols is minimized. When restricted visibility occurs during this period, it is caused by smoke and dust particles and the growth of particles as described above. In the warmer months, however, the addition of visibility reducing particles from photochemical reactions adds to the amount of material in the air.

DAMAGE TO MATERIALS AND VEGETATION

Nationally, the annual cost of air pollution damage to materials runs into the millions of dollars. Different effects, varying widely in type and severity, are associated with different contaminants. Hydrogen sulfide, for example, can darken house paint, shortening its life span and causing a need for more frequent application. Ozone — the primary constituent of photochemical smog — can harden and crack rubber materials. It also affects other synthetics, weakening nylon, fading fabric dyes and damaging paint.

Pollutants often act together, causing greater damage in combined forms than alone. This synergistic phenomenon is noted in the interaction of sulfur dioxide and particulate matter, which together have a greatly enhanced ability to corrode materials such as steel, iron, copper, zinc, tin, and stone, thereby forcing costly preventive maintenance in many industries.

Crop damage caused by air pollution is estimated to be as much as \$300 million each year in California, and up to \$5 billion nationwide. The effects of air pollution on plants, crops, and forests depend both on plant susceptibility and the types of pollutants involved. Plant damage is difficult to assess, however, because damage is often manifested as stunted growth or diminished yields, rather than the death of the plant.

Among the recorded effects of air pollution on plants are flower and foliage discoloration; bloom failure; plant malformation; leaf, needle, and fruit drop; and failure of fruit to ripen. Particularly vulnerable to ozone damage are grapes, lettuce, spinach and many garden flowers and shrubs.

HEALTH EFFECTS

Air pollution can significantly affect human health. While it is difficult to isolate the effects of air pollution from other causes, numerous studies indicate that exposure to certain pollutants can have harmful health effects. A U.S. Public Health Service publication states “. . . air pollution, as it exists in some of our communities, contributes significantly as a cause or aggravation factor for the following medical conditions: acute respiratory infections, chronic bronchitis, chronic constrictive ventilatory disease, pulmonary emphysema, bronchial asthma, and lung cancer.”

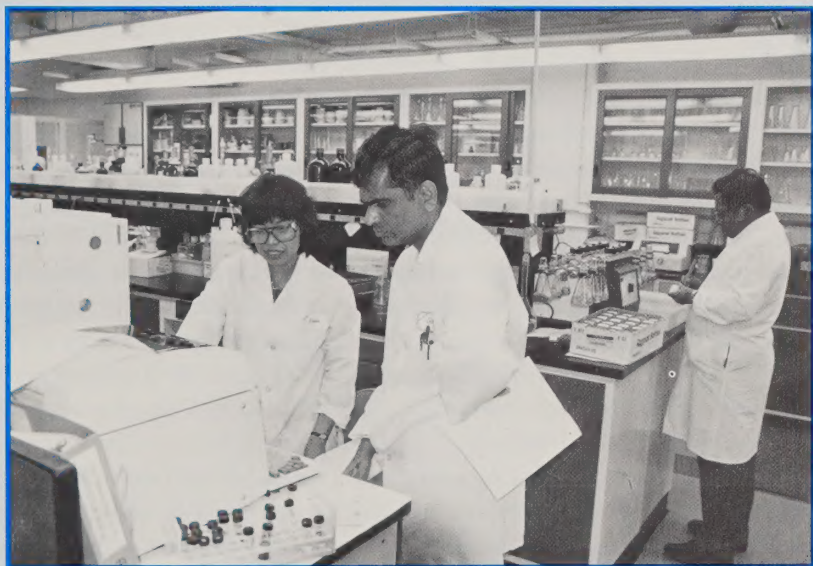
Although medical research on the health effects of air pollution is ongoing and many questions remain unanswered, the effects of some pollutants have been well documented. For instance, ozone is a strong irritant that affects the respiratory system, particularly for individuals with bronchitis, asthma, emphysema, and other respiratory conditions, and can lead to damage of lung tissue and premature aging of the lungs. According to a number of studies, sustained exposure to high levels of ozone can impair

the performance of athletes, increase chronic airway obstruction, and diminish the body's resistance to disease. In addition, children and senior citizens are particularly susceptible to unhealthy levels of ozone.

Carbon monoxide, because of its ability to displace oxygen in the blood, reduces the amount of oxygen reaching the brain, heart, and other tissues and can thereby impair heart and lung function. Exposure to high levels of carbon monoxide can also cause headaches, slow reflexes, fatigue, and dizziness.

Excessive sulfur dioxide and nitrogen dioxide exposure can cause airway constriction for asthmatics and can cause sore throats, breathing difficulties, and respiratory infections, even in healthy individuals.

Particulate matter, especially particulate matter less than 10 microns in diameter (PM_{10}), can pose a significant health threat to individuals. Because of its small size, PM_{10} is able to bypass the body's natural filtering system and penetrate deeper portions of the lung. Known effects of exposure to lower levels of PM_{10} are increased incidence of bronchial disease, coughing, and



The District's laboratory staff analyses about 3,000 samples every year. Their findings provide evidence of air quality violations ranging from the presence of asbestos found in demolition debris, to the verification of non-compliant coating product formulations. The Laboratory is part of the Technical Division and works in tandem with Source Testing and Air Monitoring in assessing the effectiveness air pollution control efforts.

minor throat irritation. At higher exposures, particulate matter has been associated with the aggravation of respiratory and cardiac diseases, reduced lung function, and death.

Highly elevated levels of sulfur oxides and particulate matter caused acute air pollution episodes in Belgium's Meuse Valley in 1930 and in Donora, Pennsylvania, in 1948. Also, as a result of widespread, uncontrolled use of coal as a fuel, London suffered many serious episodes over the years. During the winter of 1952, a four-day "pea-soup fog" resulted in 4,000 deaths; many thousands more became seriously ill. In this, as in other episodes, the increases in deaths and illnesses resulted from damage to the cardio-respiratory system.

These "killer smogs" have attracted much attention and have served to alert the public to the dangers of air pollution. Much more important in the long run, however, are the less severe but more insidious health effects associated with long-term exposure to air pollution. Millions experience this exposure daily in our urban centers. In fact, more than half of our nation's population live in cities with pollution levels considered unsafe by federal standards on at least a few days per year.

ODORS

Odors are annoying and they can be an indication of harmful air contaminants. A smell that is barely noticed by one individual may be pervasive and offensive to another. No technology has yet been developed to detect, codify and quantify odors. Nevertheless, odorous emissions are regulated by restricting the permissible release levels of certain known odor-producing compounds or odor-producing processes. Violations are determined by sampling ambient air at the property perimeter of the offending source. The samples are evaluated by a pre-qualified human nose at an "odor panel" — a controlled environment where the evaluator must correctly identify the odor out of a series of "blind" samples passed through a breathing mask.

The sources of fleeting miscellaneous odors are often difficult to identify. Under the *California Health and Safety Code* the emitter of any odor that is annoying to "a considerable number of persons or the public" may be cited. For the purpose of issuing violation notices the District requires five separate inspector-confirmed complaints from the same source to be received within 24 hours. Other criteria applies to enforcement action against chronic odor problems, and in persistent cases an abatement order will be sought. In 1992, approximately two-thirds of the 7800 complaints processed by the District were related to odors.

FEDERAL GOVERNMENT ACTIONS — EPA

The passage of the Air Quality Act of 1967, subsequently known as the Clean Air Act, provided for a national program to control automobile emissions and for vigorous support of state and local programs to control air pollution from stationary sources. In 1970, the Environmental Protection Agency (EPA) was created to bring all environmental problems—water pollution, noise, waste disposal and radiation hazards, as well as air pollution—under the direction of one agency. The 1970, 1977, and 1990 amendments to the Clean Air Act redefined and expanded the federal government's role in controlling air pollution.

Because many urban areas were unable to attain the standards set by earlier versions of the Clean Air Act, Congress adopted amendments in 1990 requiring the EPA and individual states to promulgate a wide range of new regulatory programs and to set up definitive timelines for attainment of air quality standards. Some of the major programs under the 1990 amendments include a revamped hazardous air pollutant program, a federal permit program applicable to virtually all sources of air pollution, and a program targeting precursors to acid rain (SO_2 and NO_x). The amendments also address the problem of stratospheric ozone depletion, and contain provisions for tighter emission standards for motor vehicles and fuels.

STATE CONTROLS — THE AIR RESOURCES BOARD

A program to control auto exhaust within California began in 1961 under the Motor Vehicle Pollution Control Board, long before the federal government entered the field of vehicle emission control. Even though the passage of the Air Quality Act of 1967 moved responsibility for automotive controls to the federal government, the State of California has been allowed to conduct its own vehicle program. So long as California has been able to justify a unique need for more stringent controls, it has been given the authority to establish and enforce its own standards. The unusual meteorological, geographic, and economic character of California has made it easy to establish such a need. California has more cars per capita than any other state.

The state automotive program is administered by the successor to the Motor Vehicle Pollution Control Board, the Air Resources Board (ARB), now under the auspices of the recently formed California Environmental Protection Agency (Cal-EPA). The ARB establishes emission standards for any new car sold in California and requires the manufacturers to install controls

that have been tested and certified. Assembly-line checks are required of all new cars sold in California. With each new model year since 1966, the emission controls for new cars have become progressively more restrictive.

The ARB has oversight authority over stationary source controls and has jurisdiction over consumer product regulations, administers subvention grants to local districts, and conducts research. Together with the Office of Environmental Health Hazard Assessment and local control districts, the ARB also implements the provisions of the Tanner and Connelly Bills, which are aimed at controlling toxic emissions.

Despite these regulatory efforts, many geographic areas in California continue to violate ambient air quality standards. In 1988, the Legislature enacted the California Clean Air Act to accelerate the pace and expand the scope of air pollution control efforts in California. This act establishes a legal mandate for achievement of the state's ambient air quality standards by the earliest practicable date. It prescribes a number of emission reduction strategies, both for stationary sources and mobile sources—specifically, automobiles.

AIR QUALITY STANDARDS

Air quality standards define the levels of various types of air pollutants that may not be exceeded for certain periods of time in defined areas. If standards are met, eye and throat irritation—and more serious health effects—are not expected to appear among even the most sensitive members of the public. There are ambient air quality standards for ozone, carbon monoxide, oxides of nitrogen, sulfur dioxide, PM₁₀, and lead.

California began setting air quality standards in 1969, under the provisions of the Mulford-Carrell Act. With the passage of the Clean Air Act amendments in 1970, the federal government began adopting such standards for the entire country. Federal air quality standards are divided into two categories: primary standards—designed to protect human health—and secondary standards—designed to protect property and aesthetics. A chart listing state and federal primary air quality standards appears on page 12 of this handbook.

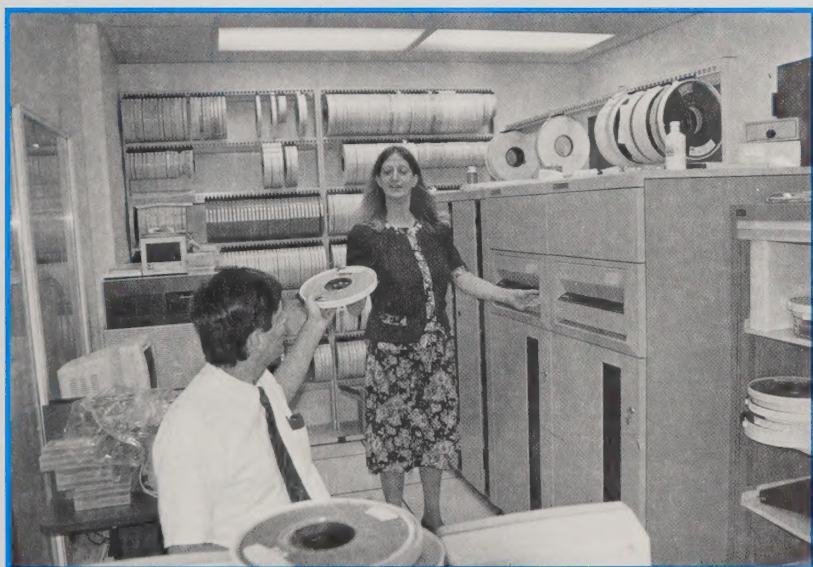
While air quality in the Bay Area is generally good, federal and state standards have sometimes been exceeded. In the 1980s, the federal ozone standard was violated in the Bay Area 5 to 10 times per year. An important milestone was reached in the Bay Area in 1992, when no ozone monitoring station recorded federal excesses of more than one day, averaged over the most recent three years. This is the first step towards attaining the federal standard.

The more stringent state ozone standard continues to be violated 10 to 20 days per year, with most exceedances occurring during hot summer days in inland valleys of the Bay Area. The carbon monoxide standard is often exceeded several times per year on cold winter nights in San Jose, and less frequently in Vallejo and San Francisco.

BAY AREA AIR QUALITY PLANS

The federal Clean Air Act requires every state to submit a State Implementation Plan to the EPA, specifying control strategies which will be used to attain federal ambient air quality standards. Elements of these plans must provide for land use and transportation controls, source monitoring, air quality monitoring, and a pre-construction review process for new sources of air pollution. These implementation plans are, in effect, a blueprint for achieving and maintaining air quality throughout the nation.

Plan preparation includes the verification of air quality models under known conditions and the application of these models to a future attainment year. The Association of Bay Area Governments (ABAG) provides population figures as well as employment and land use projections, the Metropolitan



Keeping track of 28,000 emission sources requires hefty computing power. At the District's San Francisco offices a pair of HP3000 RISC computers handles the task. These computers also assist in many environmental modeling tasks, tracking inspections and violations, calculating permit fees and penalties, and maintaining vast plant histories.

Transportation Commission (MTC) forecasts travel patterns, and the District prepares meteorological data and comprehensive inventories of pollutant emissions from all known sources. Future modeled ambient pollutant concentrations are then analyzed to seek a control strategy which will result in attainment of standards.

Because the Bay Area has been classified on the federal level as nonattainment for the carbon monoxide and ozone standards, District planners have produced nonattainment plans for these pollutants. The plans in turn have been submitted to the ARB where they have become part of California's State Implementation Plan.

THE BAY AREA '91 CLEAN AIR PLAN

Just as the federal Clean Air Act requires each state to submit a plan, the California Clean Air Act requires each local air district not meeting state air quality standards to produce a plan specifying the measures that will be taken to achieve the standards. The Bay Area '91 Clean Air Plan (CAP) was adopted by the Board of Directors in October 1991, in response to this requirement. The CAP contains measures to reduce ozone and carbon monoxide levels in the Bay Area. This plan covers the period extending from CAP adoption to the next California air quality planning update, expected in 1994. The CAP was developed by the District, in cooperation with ABAG and MTC. The goals of the CAP are to reduce the health impacts from ozone and carbon monoxide levels which exceed state ambient standards.

With the implementation of the '91 Clean Air Plan, carbon monoxide emissions, which come primarily from motor vehicle exhaust, will be reduced by about 4% per year, and the carbon monoxide standard should be attained by about 1995. Ozone precursors—reactive organics and oxides of nitrogen—are expected to be reduced by about 4.0% per year and 2.6% per year, respectively, from 1987 to 1994. Population exposure to ozone levels exceeding the state standard could be cut in half by 1994.

The strategy builds upon statewide motor vehicle control requirements and extends to:

- more stringent controls on polluting industries and businesses;
- reformulation of paints, varnishes, and consumer products to reduce volatile pollutant content;
- programs to reduce automobile use, to reduce traffic congestion, and to improve mobility; and
- programs to identify and repair highly polluting and "smoking" vehicles.

TOXIC AIR CONTAMINANT CONTROL PROGRAM

A great deal of public concern has been raised about exposure to toxic materials in the environment. Many factors have contributed to this concern, including much-publicized situations where exposures are abnormally high; annoying odors, aggravated by the unknown nature of the chemicals involved; and the environmental, social, and economic costs of handling and treating hazardous material.

The District is currently working to control two types of impact from toxic air contaminants: (1) locally elevated concentrations ("Hot Spots") and (2) ambient background concentrations.

The "Hot Spots" control strategy is fairly simple: new sources are reviewed and then required to control their emissions to prevent the formation of a "Hot Spot." Existing "Hot Spots" are identified by conducting risk assessments and by using the Toxics Emissions Inventory, which the District publishes annually.

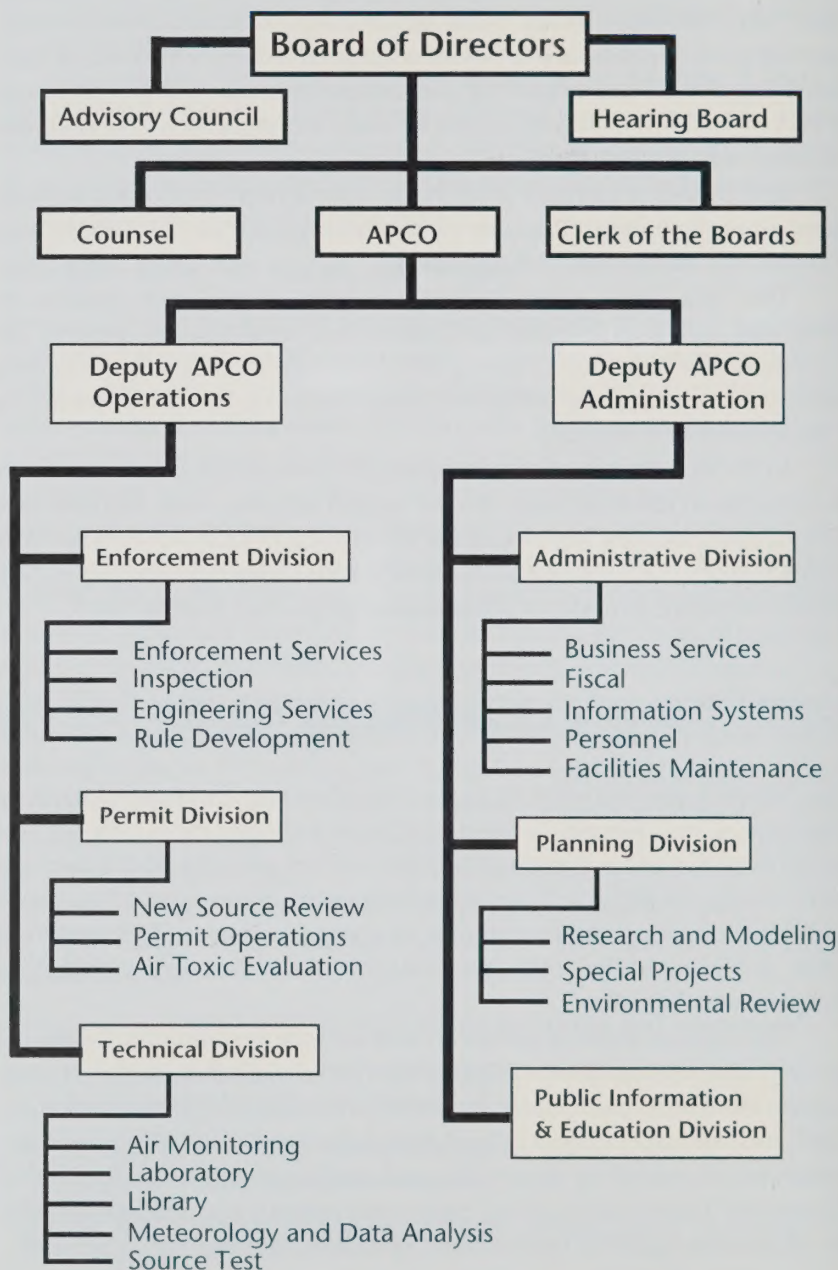
In the Bay Area, toxic air contaminants present in the ambient air are the combined result of many diverse human activities, with less than 40% coming from industry and more than 50% coming from motor vehicles. The District's Toxic Air Contaminant Reduction Plan is aimed at reducing by 50% public exposure to toxic air contaminants in the Bay Area by 1995.

BENEFITS OF AIR POLLUTION CONTROL

The District's goal is to improve air quality and protect the health of Bay Area residents. The California Air Resources Board estimates the number of lives saved or prolonged as a result of air pollution controls to be 80,000 per year, while the American Lung Association estimates a savings in health care costs of \$40 billion. Air pollution controls, by comparison, ran at \$31.9 billion in 1988, according to the 1990 Annual Report of the President's Council on Environmental Quality.

The results of these air pollution control efforts are most clearly reflected in the emission records of the following criteria pollutants: sulfur dioxide, carbon monoxide, particulates, hydrocarbons, and lead. Between 1970 and 1987, total annual emissions of lead declined nationwide by 96 percent, SO₂ emissions decreased by 28 percent, and particulate emissions declined by 61 percent. For this same period, carbon monoxide concentrations dropped by 38 percent and total hydrocarbon emissions dropped by 28 percent.

BAAQMD Organization Chart



Originally known as the Bay Area Air Pollution Control District, the Bay Area Air Quality Management District—the state's first regional agency dealing with air pollution—was created by the California Legislature in 1955 and began adopting regional rules shortly thereafter. District structure, operating procedures, and jurisdiction are provided for in Division 26 of the California Health and Safety Code.

The District's jurisdiction encompasses all of seven counties—Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara and Napa, and portions of two others—southwestern Solano and southern Sonoma. The total land area covered is 5600 square miles, with 6 million people and 4 million cars and light trucks.

The District is governed by a 20-member Board of Directors. State law provides that the number of representatives from each county will be determined by that county's population. A county with a population of 300,000 or less appoints one member to the Board of Directors; a county with a population of 750,000 or less, but more than 300,000 appoints two members. A county with a population of 1,000,000 or less but more than 750,000 appoints three members, and a county with a population of more than 1,000,000 appoints four members.

Under this plan, the counties of Marin, Napa, and Solano have one representative; San Francisco, Sonoma, and San Mateo have two representatives; Contra Costa has three representatives; and Santa Clara and Alameda each have four representatives. The Board has the authority to develop and enforce regulations for the control of air pollution within the District. All rules and regulations must be passed by a majority of the Directors. Public hearings are required prior to any action adopting or amending rules and regulations.

The District's rules are adopted by the Board of Directors. These rules have expanded and become more stringent as technology has improved and new techniques for controlling emissions have become available. Until recently, the District was largely limited to policing nonvehicular sources of air pollution, primarily industry and open burning. The California Clean Air Act of 1988 gave the District the authority, for the first time, to develop transportation control measures aimed at reducing air pollution from motor vehicles.

District regulations control air pollution directly by limiting the emissions of specific contaminants and indirectly by curtailing open burning, requiring the reformulation of materials containing organic compounds such

as paint, and by prescribing control equipment and operating procedures through the permit system. The District adopts rules to meet the regulatory needs of the Bay Area and incorporate state and federal pollution control requirements. In some cases, District measures may be more stringent than those mandates. Its rules governing stationary sources of air pollution are among the strictest in the United States.

The District's five-member Hearing Board is an independent body which hears pleas from industry for variances from District regulations and which also hears cases brought by the District against violating sources. Acting as a judicial body, the Hearing Board rules on accusations against sources that have not corrected violating conditions in a reasonable length of time. If after hearing both sides it supports the District's argument, an order of abatement is issued against the defendant that can then be enforced through Superior Court. Variances from regulations may sometimes be allowed, since it is difficult to adopt regulations that are flexible and far-sighted enough to accomplish fair and equitable control in all cases.

The Hearing Board also may hear appeals from permit decisions made by the Air Pollution Control Officer. Any company wishing to build or modify a facility must first obtain a permit from the District to ensure that the source will comply with all applicable rules. Any person or industry may appeal this decision to the Hearing Board, which has the power to uphold, modify or reverse the Air Pollution Control Officer's decision.

The Board appoints a 20-member Advisory Council from community interest groups to advise and assist the Board and District staff. The Board also appoints the Air Pollution Control Officer, the District Counsel and the Clerk of the Boards. The Air Pollution Control Officer is responsible for appointing of the rest of the staff.

The District employs over 350 people and the budget for fiscal year 1992-1993 has been set at \$32.9 million. The largest portion of District revenue is derived from permit fees (38%) and county property taxes (26%). The remaining approximate 36% of available financing is generated by penalties, federal grants, state subvention monies, general fund interest, and other miscellaneous fees, subscription and revenues.

The District has seven operating divisions: Enforcement, Permit Services, Technical Services, Planning, Legal, Administration, and Public Information and Education.

THE ENFORCEMENT DIVISION

The Enforcement Division consists of four sections—Inspection, Enforcement Services, Rule Development, and Engineering Services. Collectively, these sections work to ensure compliance with state, federal, and District regulations through a comprehensive program of inspecting and auditing air pollution sources. The Enforcement Division provides information and assistance to facilities to make them fully aware of District requirements and to enlist their support for achieving clean air goals.

With approximately a third of the total work force, the Enforcement Division is the District's largest division. Enforcement personnel are responsible for surveillance of all air pollution sources in the District; preparation, tracking, analysis, and settlement of the approximately 4,500 violation notices issued each year; regulation development; and support services. The Division also conducts a Compliance Assistance Program, which provides training and information to facilities seeking a better understanding of regulatory requirements.

The Enforcement Services Section manages the Mutual Settlement Program, the Industry Compliance School, and the new inspector and in-service training programs. Enforcement Services is also responsible for developing and revising the Division's Policies and Procedures Manual and for processing public records requests, breakdowns and monitor excesses, and citizen complaints. In addition, this section handles the administration of mandated reporting programs and the operation of the mobil communications system.

The Inspection Section is responsible for monitoring the compliance status of all stationary sources of air contaminants within the District. Inspectors are assigned geographically throughout the District and are responsible for all activities within their area, including inspections and complaint response. Inspection staff conduct more than 25,000 individual source inspections and respond to more than 10,000 public complaints each year. Specialized groups of inspectors deal with asbestos, dry cleaners, refineries, service stations, and auto body shops.

The Engineering Services Section provides field engineering support to the inspectors, manages the Division's plant auditing program, provides technical assistance to the Rule Development Section, oversees the review of Hearing Board orders, and determines excess emissions associated with variances, violation notices, and breakdowns. Engineering Services also coordinates rule effectiveness studies and participates in the Industrial Compliance Assistance program.

The Rule Development Section is responsible for conducting technical, economic, and environmental assessments for existing control measures as well as those identified in the District's Clean Air Plan. The section works with citizens and industry, as well as state, federal, and local agencies, to identify and develop control strategies for reducing air pollution.

ENFORCEMENT PROCEDURES

District inspectors issue violation notices when evidence of emissions in excess of the levels allowed by the regulations is detected. Violation notices are also issued as a result of source tests of industrial effluent and as a result of data recorded by the Ground Level Monitoring Network and Continuous Emission Monitors (in-stack monitors). These monitors are located at facilities which emit particulates, sulfur dioxides, oxides of nitrogen and hydrogen sulfide. Violation notices contain the date, time, place and type of violation, as well as a notification for the offender to explain the cause of the violation within 10 days.

A violation notice is a formal record that a violation has occurred. Once non-compliance is established, the District's job is to see that the offending source is brought back into compliance as quickly as possible. In most cases, penalties are sought to help achieve this end. Frequently, company officials are asked to come in to the District's office to discuss enforcement problems and to make commitments to solve the problem.

The District may seek civil penalties for a violation of any of its regulations. Violators are subject to a civil penalty of up to \$1,000 on a strict liability basis for each day in which a violation occurs. Most routine violations are processed as civil penalties; however, they can be treated as misdemeanors. In such cases, violators are subject to fines of up to a \$1,000 and/or six months in jail. Under state law, violators of certain emission limitations may be subject to civil penalties of up to \$10,000 per day. Where intent or negligence is proven or where a considerable number of persons are injured, penalties of up to \$15,000 may result. A maximum penalty of \$25,000 is applicable for excess emissions violations where the violator knew of the emission and failed to take corrective action within a reasonable period of time. Willful and intentional violations involving excess emissions can lead to penalties of up to \$50,000.

A major portion of the District's enforcement effort is directed towards identifying and resolving short-term problems which cause brief periods of violation. However, when a company is unable to comply with District regulations, it may apply to the Hearing Board for a variance covering a specified period of time. A variance may be granted if the Hearing Board finds that compliance was beyond the reasonable control of the company.

A primary District concern is air pollution from Bay Area oil refineries and chemical plants. Two Air Quality Inspectors probe one of thousands of flanges to detect fugitive emissions. Amendments to BAAQMD regulations governing fugitive emissions at such facilities were adopted in 1992, setting the most stringent standards for permissible leak rates anywhere in the nation.



The District may seek an order of abatement for the continuing violation of any of its regulations. An abatement order instructs the company either to take certain specified actions to correct a violation in accordance with a compliance schedule or to unconditionally cease causing violations. This order is enforceable through Superior Court. If the company fails to obey the terms of the order, it is liable for civil penalties of up to \$25,000 per day, and the District may seek an injunction from a court. Failure to comply with a court-ordered injunction can result in a contempt citation, which can lead to the imprisonment of a responsible company official until the company complies with the terms of the injunction.

PERMIT SERVICES DIVISION

Since 1972, any industrial facility wishing to locate in the Bay Area or to expand or modify its existing operation must apply to the District for a permit. The purpose of this requirement is to allow only those companies that meet District regulations and whose emissions will not interfere with the attainment and maintenance of air quality standards to operate in the Bay Area.

The primary function of the Permit Services Division is to evaluate applications for permits to build and operate industrial plants. The Division also provides information on the status of permits and the nature and amount of emissions from stationary sources. This information is available to the public and to other government agencies. The scope of this work has increased dramatically as all of the facilities with significant emissions have been brought into the permit system. By 1992, approximately 5200 facilities as well as 2800 service stations were operating under District permit.

The Permit Operations Section of the Division is responsible for accounting functions including billing facilities for permit fees, programming and operating a data system, general record keeping, and maintaining stationary source emissions data. The section also evaluates emissions banking credits and withdrawals.

The Permit Services Division also houses an Air Toxics Evaluation Section that is responsible for a Bay Area toxic pollutants inventory program, toxic air pollutant surveys, health risk assessments, and an air toxics hot spot monitoring and mitigation program.

The New Source Review Section reviews all permit applications to determine whether a project is subject to major source status and what controls should be required.

TECHNICAL SERVICES DIVISION

The Technical Services Division includes the Laboratory, Source Test, Meteorology, Air Monitoring, and the Technical Library.

The District's Laboratory Section performs a number of functions essential to the District's air pollution control program. It analyzes hundreds of source test samples each month for the Enforcement Division, and assists the air monitoring program by analyzing dust catch samples of various chemical substances. The lab also determines the regulatory standards and measurement procedures of field monitoring instruments and aids in their standardization and calibration. A quality assurance program has been established to attain and maintain high standards of accuracy, precision, and completeness of data.

During the course of the year, laboratory staff may be called upon to analyze thousands of different compounds. To do this efficiently, the staff works consistently to improve and refine analytical techniques—ranging from conventional “wet chemistry” to the most advanced chromatographic techniques. Staff members have developed new procedures for determining carbon monoxide levels, the types of organic compounds in incinerator effluents, and the sulfur content of fuel oil. Many of these refined techniques have been adopted by laboratories across the country.

The Source Test Section determines the type and quantity of pollutants emitted from a specific source by sampling the effluent. The Section maintains three vans containing instruments capable of “on-the-spot” analysis of effluent gases such as carbon monoxide, sulfur dioxide, and nitrogen oxides. The continuous emission monitoring program is administered by the Source Test Section and involves audits and data review of approximately 80 sources that are required to maintain continuous emission monitoring instruments. To assist in resolving public nuisance situations, the section also maintains two odor laboratories which collect and determine the odor content of air samples.

The Meteorology Section conducts daily weather analyses which enable the District to issue morning air pollution forecasts. Meteorology staff determine when weather conditions are favorable for the controlled burning program and also predict any adverse conditions that would warrant calling a voluntary curtailment day, a Health Advisory, or a Smog Advisory/Alert. In addition, this section also analyzes pollutant levels over long periods of time to normalize the effects of weather and thereby establish more accurate long-term trends. A number of these long-term pollutant trend studies are published by the District. Meteorology’s analysis of air flow patterns is applied in short-term enforcement evaluations and in long-term pollutant transport studies.

Technical’s Air Monitoring Section is responsible for measuring Bay Area air pollution levels through its network of 30 air monitoring stations. A number of these stations are fully equipped to continuously monitor criteria pollutants such as carbon monoxide, nitrogen oxides, hydrocarbons, ozone, and particulate matter. Some stations also record basic meteorological data such as wind speed and direction. Others are partially equipped stations which measure one or two pollutants. Additionally, since 1986 the District has maintained a network of 11 monitoring stations that measure toxic air contaminants, constituting the nation’s largest ongoing toxics monitoring network operated by a local agency.

Air monitoring operations also include a mobile sampling unit. Its three vans are equipped to sample pollutants in areas between sampling stations, both in response to citizen complaints and in connection with source surveillance. This group also calibrates instruments and evaluates data recorded on ground-level monitors for sulfur dioxide and hydrogen sulfide.

The District’s Technical Library has combined resources of over 30,000 titles, including 600 books, 4,000 technical reports, over 26,000 microform entries and 75 scientific periodicals. The Library serves as an authoritative information base in the field of air quality management, and is open to the public during regular business hours.

The District's toll-free complaint number (1-800-334-ODOR) is stenciled onto one of 30 new methanol vehicles. The flexible-fuel sedans are used by air quality inspectors who conduct source inspections and answer citizen complaints throughout the District's nine-county jurisdiction.



PLANNING DIVISION

The Planning Division prepares and updates areawide plans to achieve the District's goal of healthy air, defined as the attainment and maintenance of federal and state ambient air quality standards. To assist in such planning, the Division provides specialized expertise in two technical areas—calculation of regional emissions inventories and computer modeling of regional air quality. Future year inventory estimates are used to predict future air quality. Air quality planning is done on a comprehensive basis with other concerned agencies, especially the Metropolitan Transportation Commission and the Association of Bay Area Governments. The EPA and the California Air Resources Board provide important support for the overall effort.

To accomplish these tasks, a variety of technical specialists are needed. Comprised of engineers, planners, meteorologists, modelers, and statistical experts, the Planning Division also reviews and evaluates the air quality consequences of new development in the Bay Area. For major industrial projects, complex air quality analyses are performed and applications (for authorities to construct) are evaluated with respect to current District regulations.

Under the provisions of the California Environmental Quality Act, the Division also reviews and comments on the air quality sections of environmental documents for other projects. Planners cooperate with other governmental agencies at all levels to promote development decisions which consider and minimize air quality problems.

The management of transportation facilities is a subject of increasing concern. The Planning Division, in cooperation with cities, counties, and other agencies, develops and implements transportation control measures to reduce vehicle travel and vehicle emissions in the air basin.

OTHER STAFF FUNCTIONS

Additional activities are carried out by the District staff to assist the Board of Directors, the Hearing Board, and the Advisory Council and to support the enforcement program. The District Counsel provides legal advice and assistance to the Board, the Advisory Council and the Air Pollution Control Officer. The Counsel prepares cases presented before the Hearing Board and represents the District in Court.

The Clerk of the Boards keeps minutes for the Board of Directors and Advisory Council, and is responsible for legal filings, records, and Hearing Board orders. The Administrative Services Division handles the District's fiscal affairs, and is responsible for personnel, purchasing, data processing, business affairs, and building and auto maintenance. Administration is also responsible for the subscription service which provides updates for District regulations and changes to the Permit Handbook and Manual of Procedures, as well as the minutes and agendas of the Board of Directors and Advisory Council meetings.

The Public Information and Education Division disseminates information on the District's programs and activities to the public and the news media, and coordinates an extensive public outreach campaign, which includes an active speakers bureau and regionwide local resource teams. This Division is also responsible for District publications, including a free monthly newsletter, *Air Currents*. It also provides publication services—technical editing/writing and desktop publishing—for the other District divisions.

District controls on stationary sources of air pollution and state controls on vehicular emissions have steadily reduced air pollution levels in the Bay Area. Ozone reached its highest levels in 1969, and excesses have been reduced by 85% since that time. Similarly, carbon monoxide, sulfur dioxide, particulate matter, and nitrogen dioxide levels have also decreased. These improvements in air quality have been achieved despite both a growing population and increased industrial development in the Bay Area.

Unfortunately, District studies show that this trend toward lower emissions and cleaner air can be overwhelmed by growth. For example, even with the strict controls currently imposed on automobiles, a steadily increasing number of people, cars, and vehicle trips can overcome the gains already realized. To attain and maintain ozone and carbon monoxide standards, the region will have to rely on reduction of vehicle emissions through new car standards, the Smog Check program, and transportation systems management. The District must also continue to review and change when necessary its methods for the control of emissions from stationary sources.

Many significant changes have been enacted to strengthen District regulations, and new strategies to deal with air pollution have been adopted. The continued development of new technology and its application to existing sources, together with such concepts as controlled growth, will also help clean the air.

But it is important to keep in mind that most of the pollution in the Bay Area is generated by individuals in their day-to-day activities, particularly driving. Individuals and communities will play a major role in the future successes in cleaning the air. Here is a checklist of ways you can help:



REDUCE YOUR DRIVING OR LEAVE YOUR CAR AT HOME.

Whenever possible try carpooling, walking, biking, or using public transportation - even if it's only once a week. For help in joining a carpool or vanpool call RIDES at (800) 755-POOL, in Berkeley call (510) 644-POOL, in Santa Clara County call Commuter Network (408) 453-4030, in Santa Cruz call (408) 429-POOL, and in Solano County call (707) 447-POOL.



TRIP LINK -- COMBINE SMALL TRIPS INTO SINGLE LARGER ONES.

Cars pollute the air five times more after a "cold" start than after a "warm" start, because the catalytic converter has not yet reached its efficient operating temperature. Once warmed, the converter will remain so for about an hour after the engine has been shut off. One easy way to reduce the pollution caused by cold starts is to link your trips together so that your car does not cool off between trips.



KEEP YOUR CAR TUNED UP.

A well-maintained car burns fuel more efficiently—reducing pollution and allowing for better gas mileage. Keep your car in tune and get smog checks regularly. Never remove emission control equipment—performance will not improve.



DON'T USE FIREPLACES OR WOODSTOVES.

On days when pollutant levels are high, don't use your fireplace or woodstove unless it is EPA certified or the equivalent. When you do burn, use only dry clean wood - not trash. Allow adequate air into the woodstove's firebox; small, hot fires are less polluting. Consider retrofitting your fireplace to burn natural gas.



REPLACE GASOLINE-POWERED LAWN AND GARDEN EQUIPMENT.

Products powered by gasoline, such as lawn mowers, leaf blowers, and chain saws, emit large amounts of harmful pollutants. Replace products that use a gasoline engine with electric or non-motorized models.



AVOID THE USE OF AEROSOL PRODUCTS.

Aerosol products contain large amounts of volatile organic compounds, which contribute to the formation of smog. Choose alternative, non-aerosol forms of these products.



RECYCLE AND CONSERVE.

Anything that can be used again will help prevent air pollution because it needn't be buried in a landfill or burned. One of the best ways to reduce air pollution is to prevent it from being generated in the first place. You can help to do this by reducing your energy consumption, reducing the amount of products you use, and providing regular maintenance for your consumer goods to extend their lifespan. Not only does this cut down on the formation of air pollution, but it helps to preserve resources.



REPORT INDUSTRIAL POLLUTION, SMOKING VEHICLES, AND BACKYARD BURNING.

The District maintains 24-hour toll-free telephone lines for receiving your complaints. For odor, backyard burning and industrial complaints call: 1 (800) 334-ODOR. To report a smoking vehicle call: 1 (800) EXHAUST.



EDUCATE YOURSELF.

Learn as much as possible about air pollution and its control. The District's monthly newsletter, *Air Currents*, is available free of charge. To place yourself on the mailing list and to learn about other air quality publications, call the Public Information office at (415) 749-4900.

APPENDIX I

District Rules and Regulations

Regulation 1—General Provisions and Definitions. The provisions and definitions in this Regulation are applicable to all District Regulations and are in addition to the provisions and definitions in individual Rules and Regulations. Regulation 1 includes sections on exclusions, breakdown procedures, definition of terms, registration, right of access, sampling facilities, record maintenance, and many other provisions.

Regulation 2—Permits. This Regulation specifies the requirements for Authorities to Construct and Permits to Operate.

Rule 1—General Requirements. Includes procedures for issuance or denial of permits, exemptions, appeals against decisions of the APCO and District action on applications.

Rule 2—New Source Review. Applies to new or modified sources which emit more than 365 pounds per year (5 pounds per day) of criteria pollutants or non-precursor organic compounds. Rule 2 reviews new and modified stationary sources and also has provisions relative to Best Available Control Technology.

Rule 3—Power Plants. Contains special provisions for the review, and standards for the approval of, authorities to construct power plants within the District.

Rule 4—Emissions Banking. Includes procedures for banking and offsets. Establishes a small facility bank for offsets for facilities that emit less than 25 tons per year of NOX and precursor volatile organics.

Regulation 3—Fees. This Regulation establishes fees to be charged for Hearing Board filings, for permits and other District services.

Regulation 4—Air Pollution Episode Plan. A system designed to reduce levels of air contaminants which may be harmful to health and to protect that portion of the population at risk. Establishes control and advisory procedures when specified levels have been or are forecasted to be reached at each of four stages.

Regulation 5—Open Burning. Generally prohibits open burning, but also allows for exemptions such as agricultural burning, disposal of hazardous materials, fire training, and range, forest, and wildlife management.

Regulation 6—Particulate Matter and Visible Emissions. Limits the quantity of particulate matter in the atmosphere by controlling emission rates, concentration, visible emissions and opacity.

Regulation 7—Odorous Substances. Establishes general limitations on odorous substances and specific emission limitations on certain odorous compounds.

Regulation 8—Organic Compounds. Limits the emission of organic pollutants as follows:

- Rule 1—General Provisions**
- Rule 2—Miscellaneous Operations**
- Rule 3—Architectural Coatings**
- Rule 4—General Solvent and Surface Coating Operations**
- Rule 5—Storage of Organic Liquids**
- Rule 6—Terminals and Bulk Plants**
- Rule 7—Gasoline Dispensing Facilities**
- Rule 8—Wastewater (Oil-Water) Separators**
- Rule 9—Vacuum Producing Systems**
- Rule 10—Process Vessel Depressurization**
- Rule 11—Metal Container, Closure and Coil Coating**
- Rule 12—Paper, Fabric and Film Coating**
- Rule 13—Light and Medium Duty Motor Vehicle Assembly Plants**
- Rule 14—Surface Coating of Large Appliances and Metal Furniture**
- Rule 15—Emulsified and Liquid Asphalts**
- Rule 16—Solvent Cleaning Operations**
- Rule 17—Petroleum Dry Cleaning Operations**
- Rule 18—Valves and Connectors at Petroleum Refinery Complexes, Chemical Plants, Bulk Plants, and Bulk Terminals**
- Rule 19—Surface Coating of Miscellaneous Metal Parts and Products**
- Rule 20—Graphic Arts Printing and Coating Operations**
- Rule 21—Rubber Tire Manufacturing Operations**
- Rule 22—Valves and Flanges at Chemical Plants**
- Rule 23—Coating of Flatwood Paneling and Wood Flat Stock**
- Rule 24—Pharmaceutical and Cosmetic Manufacturing Operations**
- Rule 25—Pump and Compressor Seals at Petroleum Refineries and Chemical Plants, Bulk Plants, and Bulk Terminals**
- Rule 26—Magnet Wire Coating Operations**
- Rule 27—Synthetic Solvent Dry Cleaning Operations**
- Rule 28—Pressure Relief Valves at Petroleum Refineries, Chemical Plants**
- Rule 29—Aerospace Assembly and Component Coating Operations**
- Rule 30—Semiconductor Manufacturing Operations**
- Rule 31—Surface Coating of Plastic Parts and Products**
- Rule 32—Wood Products Coatings**
- Rule 33—Gasoline Bulk Terminals and Gasoline Delivery Vehicles**
- Rule 34—Solid Waste Disposal Sites**
- Rule 35—Coatings, Ink and Adhesive Manufacturing**
- Rule 36—Resin Manufacturing**

- Rule 37—Natural Gas and Crude Oil Production Facilities
- Rule 38—Flexible and Rigid Disc Manufacturing
- Rule 39—Gasoline Bulk Plants and Gasoline Delivery Vehicles
- Rule 40—Aeration of Contaminated Soil and Removal of Underground Storage Tanks
- Rule 41—Vegetable Oil Manufacturing Operations
- Rule 42—Large Commercial Bread Bakeries
- Rule 43—Surface Coating of Marine Vessels
- Rule 44—Marine Vessel Loading Terminals
- Rule 45—Motor Vehicle and Mobile Equipment Coating Operations
- Rule 46—Marine Tank Vessel to Marine Tank Vessel Loading
- Rule 47—Air Stripping and Soil Vapor Extraction Operations
- Rule 48—Industrial Maintenance Coatings
- Rule 49—Aerosol Paint Products
- Rule 50—Polyester Resin Operations
- Rule 51—Adhesive and Sealant Products

Regulation 9—Inorganic Gaseous Pollutants. Limits inorganic gaseous pollutants as follows:

- Rule 1—Sulfur Dioxide
- Rule 2—Hydrogen Sulfide
- Rule 3—Nitrogen Oxides from Heat Transfer Operations.
- Rule 4—Nitrogen Oxides from Fan Type Residential Central Furnaces
- Rule 5—Hydrogen Sulfide from Geothermal Power Plants
- Rule 6—Nitrogen Oxides Emissions from Natural Gas Fired Water Heaters
- Rule 7—Nitrogen Oxides and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters
- Rule 8—Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines

Regulation 10—Standards of Performance for New Stationary Sources. Establishes emission and/or performance standards for new plants and other sources. The rules are incorporated by reference to the provisions of Part 60, Chapter 1, Title 40, of the Code of Federal Regulations.

Regulation 11—Hazardous Pollutants. Sets emission and/or performance standards for hazardous pollutants as follows:

- Rule 1—Lead
- Rule 2—Asbestos Demolition, Renovation and Manufacturing
- Rule 3—Beryllium
- Rule 4—Beryllium Rocket Motor Firing

Rule 5—Mercury

Rule 6—Vinyl Chloride

Rule 7—Benzene

Rule 8—Hexavalent Chromium

Rule 9—Ethylene Oxide Sterilizers

Rule 10—Hexavalent Chromium Emissions from Cooling Towers

**Rule 11—National Emission Standard For Benzene Emissions from
Coke By-Product Recovery Plants and Benzene Storage
Vessels**

**Rule 12—National Emission Standard For Benzene Emissions from
Benzene Transfer Operations and Benzene Waste
Operations**

Rule 13—Medical Waste Incinerators

Rule 14—Asbestos-Containing Serpentine

Regulation 12—Miscellaneous Standards of Performance. Establishes emission and/or performance standards for plants and operations that are not otherwise included in District Regulations.

Rule 1—Kraft Pulp Mills

Rule 2—Rendering Plants

Rule 3—Asphalt Air Blowing

Rule 4—Sandblasting

Rule 5—Phosphate Fertilizer Plants

Rule 6—Acid Mist from Sulfuric Acid Plants

Rule 7—Motor Vehicle Air Conditioner Refrigerant

Regulation 13—Transportation Control Measures.

Rule 1—Trip Reduction Requirements for Large Employers

APPENDIX II

Air Quality Statistics

Air Pollution in the Bay Area by Station and Contaminant (1992)

Stations by Sub-Region	OZONE				CO		NO ₂		SO ₂		PM ₁₀		
	Max Hr	Days Ntl.	Cal.	3-Yr Avg.	Max 8-Hr	Days Ntl.	Max Hr	Days Cal.	Max 24-Hr	Days Cal.	Ann. Geo. Mean	Days Ntl.	Days Cal.
North Counties													
Santa Rosa	8	0	0	0.0	4.0	0	10	0	-	-	-	-	-
Napa	9	0	0	0.0	5.1	0	6	0	-	-	23.9	0	5
Vallejo	10	0	1	0.0	6.4	0	7	0	8	0	-	-	-
Fairfield	10	0	3	0.0	-	-	-	-	-	-	-	-	-
Sonoma	9	0	0	0.0	-	-	-	-	-	-	-	-	-
Central Bay													
San Francisco	8	0	0	0.0	6.4	0	9	0	11	0	27.6	0	9
San Rafael	7	0	0	0.0	4.8	0	8	0	-	-	22.0	0	5
Richmond	8	0	0	0.0	4.0	0	8	0	8	0	23.4	0	3
Oakland	8	0	0	0.0	4.5	0	-	-	-	-	-	-	-
San Leandro	11	0	2	0.0	-	-	-	-	-	-	22.7	0	2
Peninsula													
Redwood City	9	0	0	0.0	4.9	0	10	0	-	-	24.9	0	7
Mountain View	11	0	1	0.0	-	-	-	-	-	-	-	-	-
East Contra Costa													
Concord	11	0	3	0.0	5.3	0	11	0	8	0	22.6	0	8
Pittsburg	11	0	3	0.0	3.8	0	8	0	21	0	-	-	-
Bethel Island	11	0	7	0.0	3.9	0	7	0	11	0	22.6	0	4
So. Alameda County													
Livermore	11	0	14	0.7	4.3	0	11	0	-	-	25.8	0	5
Fremont	12	0	5	0.3	4.1	0	9	0	-	-	23.7	0	4
Hayward	13	1	1	0.3	-	-	-	-	-	-	-	-	-
Santa Clara Valley													
San Jose, 4th St	12	0	3	0.0	7.3	0	10	0	-	-	28.4	0	13
Alum Rock, S.J.	13	1	5	0.3	-	-	-	-	-	-	-	-	-
Burbank, S.J.	11	0	1	0.3	7.5	0	10	0	-	-	29.5	0	9
Moorpark, S.J.	-	-	-	-	-	-	-	-	-	-	23.8	0	8
Tully Road, S.J.	-	-	-	-	-	-	-	-	-	-	26.3	0	11
Los Gatos	13	1	3	0.3	-	-	-	-	-	-	-	-	-
Gilroy	12	0	12	0.3	3.5	0	-	-	-	-	-	-	-
District Days		2	23			0		0		0		0	18

* Cal PM₁₀ days based on 6-day National schedule for comparability.

Ambient Air Quality Standards and Explanatory Notes

Pollutant	Averaging Time	California Standards	National Standards	Measurement Method
Ozone	1 Hour	9 ppm	12 ppm	UV Photometry
Carbon Monoxide	8 Hour 1 Hour	9.0 ppm 20 ppm	9 ppm 35 ppm	Non-dispersive Infrared Spectroscopy (NDIR)
Nitrogen Dioxide	Annual Average 1 Hour	- 25 ppm	5.3 ppm	Gas Phase Chemiluminescence
Sulfur Dioxide	Annual Average 24 Hour	- 50 ppb	30 ppb 140 ppb	Pulsed Ultraviolet Fluorescence
Suspended Part. Matter (PM ₁₀)	Annual Average 24 Hour	30 µg/m ³ 50 µg/m ³	50 µg/m ³ 150 µg/m ³	Size Selective Inlet High Volume Sampler

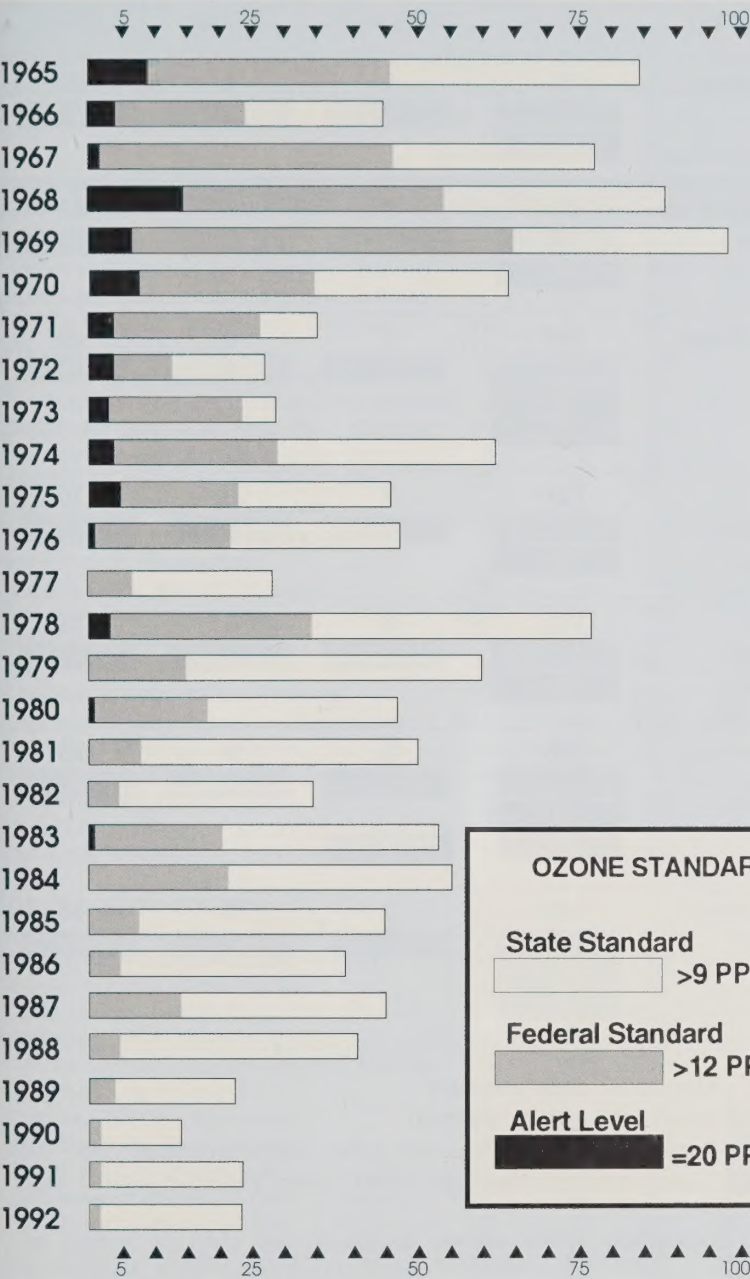
EXPLANATORY NOTES

The maximums and means in the summary table are in the same units given in the above Air Quality Standards table. These units are parts per hundred million (pphm) for ozone and nitrogen dioxide, parts per million (ppm) for carbon monoxide, parts per billion (ppb) for sulfur dioxide, and micrograms per cubic meter (µg/m³) for suspended particulate matter (PM₁₀). Most of these units are decimal point adjustments of the basic standard statements made for ease of reading. For example, the National ozone standard of 0.12 ppm is merely restated as 12 pphm.

"Days" columns give the number of days per year on which an air quality standard was exceeded. National for CO, California for NO₂ and SO₂, both for O₃ and PM₁₀. The California and National standards vary sharply for O₃ and PM₁₀, with California 25% more stringent on ozone and 67% more stringent on 24-hour suspended particulate matter (PM₁₀). In addition, the 3-year average for ozone days, adjusted for instrument down-time, is the governing National standard (called Expected Annual Exceedance). The bottom row of "District Days" is not a sum of excesses at individual stations, because excesses often are concurrent at several stations.

Generally, the particulate measurements are taken on the National systematic 6-day schedule.

District Days Over Ozone Standards (1965 -1992)



OZONE STANDARDS

State Standard

>9 PPHM

Federal Standard

>12 PPHM

Alert Level

≥20 PPHM

1991 California Air Quality Excess Days*

Air Basin	Ozone	Carbon Monoxide	Nitrogen Dioxide	PM ₁₀
Bay Area	23	5	0	23
	2	4	0	2
	0			
Sacramento Valley	71	8	0	50
	14	6	0	0
	7			
San Diego	106	0	0	20
	27	0	0	0
	8			
	1			
San Joaquin Valley	131	3	0	70
	51	3	0	9
	16			
South Central Coast	111	0	0	35
	35	0	0	0
	7			
South Coast	183	49	9	56
	130	44	0	4
	100			
	47	2		
Southeast Desert	149	0	0	58
	109	0	0	7
	81			
	3			

Days over state standard

Days over federal standard

"Health Advisory" days (15 pphm ozone averaged over 1hr.)

"Smog Advisory/Alert" (20 pphm ozone averaged over 1 hr.)

*For a comparison of the various standards, see chart on bottom of page 38. State PM₁₀ standard based on 6-day federal schedule for comparability.

APPENDIX III

Major Point Sources of Air Pollution Emissions in the Bay Area

The following list shows the larger point sources and their 1992 estimated annual average emissions in tons per year. The emissions shown are the pollutant totals for each plant with all equipment operating normally and in compliance with all air pollution control regulations. Emissions of less than 1 ton per year are represented by a dash (--).

ANNUAL EMISSIONS (TONS/YEAR)

PLANT NAME	PARTICULATE	TOG	NO _x	SO _x	CO
ALAMEDA COUNTY					
American Brass and Iron Foundry, Oakland	10	125	48	72	—
American National Can Corp, San Leandro	—	336	20	—	5
Anchor Glass Container Corp, Hayward	130	—	301	123	7
Conagra, Inc, Oakland	125	—	—	—	—
Continental White Cap, Inc, Hayward	4	176	6	—	1
Courtaulds Aerospace Coatings, Inc, Berkeley	—	85	1	—	—
Del Monte Corp - Can Mfg. Plant, Oakland	—	202	4	—	—
Domtar Gypsum Inc, San Leandro	3	2	96	—	13
East Bay Municipal Utility Dist, Oakland	3	26	443	17	113
Hunt Wesson Foods, Inc, Hayward	—	270	4	—	—
James River II, Inc, San Leandro	—	86	5	—	1
Jamieson Co, Pleasanton	73	96	—	—	—
Mission Valley Asphalt Co, Sunol	78	—	5	—	1
Naval Air Station, Alameda	29	155	80	6	17
New United Motor Mfg., Inc, Fremont	1	1303	58	—	15
O L S Energy, Berkeley	8	19	107	—	68
Oakland Scavenger Co, Livermore	12	5	116	2	46
Owens-Brockway Glass Container, Oakland	348	10	870	121	20
Reynolds Metals Co, Hayward	—	207	6	—	2
Tri/Valley Growers Container, Fremont	—	190	4	—	1
Union Sanitary District, Union City	1	13	90	6	45
United States Pipe & Foundry Co, Union City	2	144	107	160	3
University of California, Berkeley	1	14	180	—	14
CONTRA COSTA COUNTY					
American Rock and Asphalt, Richmond	125	—	2	1	—
Anchor Glass Container Corp, Antioch	164	1	499	77	10
Brookside Hospital, San Pablo	—	36	85	—	11
California & Hawaiian Sugar Co, Crockett	85	18	326	16	51
California Oils Corp, Richmond	2	81	13	—	5
Central Contra Costa Sanitary Dist, Martinez	3	37	112	—	14
Chevron Corp, Concord	1	122	57	—	63
Chevron USA, Inc, Richmond	187	4636	3610	598	322
Dow Chemical Co, Pittsburg	69	199	784	2	297
E. I. du Pont de Nemours & Co, Antioch	23	17	50	—	8388
GWF Power Systems, LP (Site 1), Pittsburg	11	18	49	72	77
GWF Power Systems, LP (Site 2), Pittsburg	7	20	54	80	85
GWF Power Systems, LP (Site 3), Antioch	12	23	64	93	99
GWF Power Systems, LP (Site 4), Antioch	11	20	56	82	87

ANNUAL EMISSIONS (TONS/YEAR)

PLANT NAME	PARTICULATE	TOG	NO _x	SO _x	CO
GWF Power Systems,LP (Site 5), Pittsburg	13	22	63	91	97
Gaylord Container Corp, Antioch	26	73	128	1	259
Gaylord Container Corp, Antioch	81	125	561	125	405
General Chemical Corp, Richmond	13	—	6	195	—
Martinez Cogen Ltd. Partnership, Martinez	16	24	448	8	86
Pacific Gas & Electric Co, Pittsburg	108	118	4594	101	1139
Pacific Gas and Electric Co, Antioch	63	51	2607	152	547
Pacific Refining Co, Hercules	16	480	422	284	70
Paktank Corp - Richmond Tmnl., Richmond	—	90	—	—	—
Port Costa Materials, Inc, Port Costa	102	172	33	73	98
Rhone-Poulenc Basic Chemicals, Martinez	30	—	13	351	2
Shell Oil Co, Martinez	511	2008	3913	2257	381
Tosco Corp, Avon Refinery, Martinez	525	2662	3479	5310	473
Trumbull Asphalt Co, Martinez	6	76	—	—	45
USS-POSCO Industries, Pittsburg	400	44	35	—	11
Union Chemicals, Rodeo	60	—	614	1651	10
Unocal Corp, Rodeo	72	1071	1602	621	213
W. Contra Costa Sanitary Landfill, Richmond	2	137	192	—	261

MARIN COUNTY

(None)

NAPA COUNTY

Homestake Mining Co, Napa	342	46	3	—	—
Syar Industries Inc, Napa	86	3	6	—	1

SAN FRANCISCO COUNTY

ICI-Glidden Co, San Francisco	—	169	3	—	—
P. G. & E., Hunters Point, San Francisco	18	15	1147	4	213
P. G. & E., Potrero, San Francisco	26	25	1234	86	205
P. G. & E., Station T, San Francisco	2	1	93	—	21

SAN MATEO COUNTY

American Rock & Asphalt, Inc, Brisbane	201	—	4	—	1
Browning-Ferris Industries, Half Moon Bay	3	75	16	—	139
Laidlaw Gas Recovery Systems, Menlo Park	2	17	87	—	195
Raychem Corp, Menlo Park	19	78	10	—	2
United Airlines, Maintenance Ops., SFO	35	239	258	3	62

SANTA CLARA COUNTY

Azevedo Quarry, San Jose	299	—	4	—	—
Cardinal Cogen a Joint Venture, Palo Alto	24	55	295	1	198
City of Mountain View (Shoreline)	—	113	18	—	5
City of Santa Clara, Electric Department	4	12	119	—	33
City of Sunnyvale Water Pollution Control	—	42	95	10	18
Container Corp of America, Santa Clara	—	121	—	—	—
Container Corp of America, Santa Clara	14	21	415	—	29
Dept of Convention & Cult. Affairs, San Jose	—	84	204	—	26
FMC Corp - Ground Systems Div., San Jose	—	87	11	—	2

ANNUAL EMISSIONS (TONS/YEAR)

PLANT NAME	PARTICULATE	TOG	NO _x	SO _x	CO
Gas Recovery Systems, Inc, San Jose	1	32	47	—	97
Gilroy Foods, Inc, Gilroy	10	48	315	2	27
Int'l Power Tech. (SJ State), San Jose	3	7	91	—	25
Kaiser Cement and Gypsum, Cupertino	203	303	1614	402	2196
Laidlaw Gas Recovery Systems, San Jose	4	171	134	—	215
Laidlaw Gas Recovery Systems, Mountain View	2	21	42	—	99
O L S Energy-Agnews, San Jose	14	6	116	—	116
Onizuka Air Force Base, Sunnyvale	5	11	146	1	41
Owens-Corning Fiberglas Corp, Santa Clara	54	115	42	2	10
Quebecor Printing S. J. Inc, San Jose	—	163	7	—	2
Raisch Products, Sunnyvale	127	—	3	—	—
San Jose/Santa Clara Water Pollution Control	14	267	309	15	219
Solelectron Corp, Milpitas	—	80	—	—	—
Sun Garden Packing Co, San Jose	—	—	115	—	9

SOLANO COUNTY

Anheuser-Busch, Inc, Fairfield	1	11	89	—	15
Ball Metal Container Group, Fairfield	—	227	10	—	2
Exxon Corp, Benicia	272	1465	3434	5601	588
Mare Island Naval Shipyard, Vallejo	68	39	268	9	33
Solano County Public Works, Fairfield	—	70	171	—	22

SONOMA COUNTY

American Rock & Asphalt Inc, Petaluma	129	—	24	—	6
City of Santa Rosa, Santa Rosa	—	30	66	—	205
Kaiser Sand & Gravel Co, Santa Rosa	98	4	5	8	4
Rock Recycle Co, Sebastopol	200	—	—	—	—
Sonoma County Public Works, Cotati	—	94	41	—	10
Sonoma Developmental Center, Eldridge	16	7	179	11	46
Sonoma Rock Co, Sonoma	145	—	3	—	—

APPENDIX IV

1991 Bay Area Annual Average Emissions by Source Category

The following emissions inventory is projected from the base year data of 1987.

DAILY EMISSIONS (TONS/DAY)

SOURCE CATEGORY	PARTICULATE	TOG (ROG)	NO _x	SO _x	CO
INDUSTRIAL PROCESSES					
Petroleum Refining	2.4	8.3 (8.0)	11.3	40.4	1.8
Other Refining Processes	0.1	0.5 (0.5)	--	--	--
Combustion of Fuels	2.0	0.8 (0.5)	38.7	6.2	4.6
Loading Storage and Blending	--	14.6 (13.6)	--	--	--
Process Leaks (fugitive)	--	20.4 (15.1)	--	--	--
Chemical Production Plants	0.2	2.5 (2.4)	--	2.8	0.1
Other Chemical	1.0	1.8 (0.8)	2.1	4.1	28.8
Food, Wine, and Agricultural	27.6	3.3 (2.9)	0.1	--	--
Metallurgical and Mineral	20.1	1.4 (1.4)	0.1	1.4	0.1
Waste Management	0.2	341 (4.9)	0.2	0.4	--
Gas Distribution	--	47.3 (3.0)	--	--	--
Construction Operations	141	-- --	--	--	--
Other Industrials	2.5	7.1 (6.3)	0.2	--	0.1
ORGANIC COMPOUND EVAPORATION					
Gasoline Bulk Plants & Filling Stations	--	21.5 (21.5)	--	--	--
Coatings, Adhesives and Sealants	--	77.6 (76.9)	--	--	--
Solvent Degreasing	--	11.7 (6.6)	--	--	--
Dry Cleaners	--	5.5 (5.5)	--	--	--
Printing	--	6.1 (6.1)	--	--	--
Other Organics Evaporation	--	1.4 (1.1)	--	--	--
COMBUSTION					
Domestic	31.0	34.7 (17.0)	26.0	1.1	190
Utilities - Power Plants	1.3	0.3 (0.2)	21.3	9.0	4.2
Cogeneration	0.6	3.3 (1.7)	12.3	0.6	3.8
Reciprocating Engines	0.3	3.4 (0.9)	13.6	0.2	4.2
Other Fuels Combustion	0.7	1.8 (0.6)	31.4	3.6	10.9
Waste Burning and Incineration	1.1	0.9 (0.7)	0.9	0.3	2.9
MOBILE SOURCES					
Cars & Light Duty Gasoline Trucks	25.4	150 (137)	144	8.4	1100
Medium & Heavy Duty Gas Trucks	23.5	63.5 (58.6)	139	17.9	513
Diesel Trucks and Buses	1.3	0.9 (0.8)	7.0	1.0	3.9
Motorcycles	0.1	3.6 (3.4)	1.2	0.1	11.7
Farm and Construction Equipment	3.1	18.5 (18.0)	67.7	5.3	237
Ships, Boats and Locomotives	1.4	21.2 (20.5)	16.0	17.5	81.9
Lawn, Garden and Other Utility Equip.	1.5	10.3 (9.3)	1.3	0.2	105
Aircraft	2.6	18.5 (16.6)	16.1	0.6	75.3
MISCELLANEOUS					
Unplanned Fires	7.9	5.5 (3.9)	0.7	--	50.3
Biogenic	--	273 (273)	--	--	--
Entrained Road and Land Dust	703	-- --	--	--	--
Consumer Solvent Usage	--	49.3 (49.3)	--	--	--
Pesticides & Other Miscellaneous	42.2	86.0 (30.4)	--	--	0.1
TOTAL	1044	1318 (819)	551	121	2428

APPENDIX V

Air Pollution Glossary

- Abatement**—the reduction in degree or intensity, or elimination, of pollution.
- Acid Deposition**—a term for the conversion of sulfur oxide and nitrogen oxide emissions into acidic compounds which precipitate in rain, snow, fog, or dry particles.
- Acute**—occurring over a short period of time; used to describe brief exposures and effects which appear promptly after exposure.
- Adverse Health Effects**—health effects from exposure to air contaminants that may range from relatively mild temporary conditions, such as minor eye or throat irritation, shortness of breath, or headaches, to permanent and serious conditions such as birth defects, cancer, or damage to lungs, nerves, liver, heart, or other organs.
- Aerosol**—particle of solid or liquid matter that can remain suspended in the air because of its small size (generally under one micron).
- Afterburner**—an air pollution abatement device that removes undesirable organic gases through incineration.
- Air**—so-called pure air is a mixture of gases containing about 78 percent nitrogen; 21 percent oxygen; less than 1 percent of carbon dioxide, argon, and other inert gases; and varying amounts of water vapor.
- Air Basins**—areas defined by geographical or administrative boundaries; used for air pollution control programs.
- Air Monitoring**—sampling for and measuring of pollutants present in the atmosphere.
- Air Pollution**—the presence of polluting gases and suspended particles in the atmosphere in excess of air quality standards.
- Air Quality Criteria**—the varying amounts of pollution and lengths of exposure at which specific adverse effects to health and comfort take place.
- Air Quality Maintenance Plan (AQMP)**—a plan developed to attain and maintain an air quality standard.
- Air Quality Management District (AQMD)**—local agency charged with controlling air pollution and attaining air quality standards. The Bay Area Air Quality Management District is the regional AQMD that includes all of seven counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo and Santa Clara) and the southern halves of Solano and Sonoma counties.
- Air Quality Standard (AQS)**—the prescribed level of a pollutant in the outside air that cannot be exceeded during a specific time in a specified geographical area. Established by both federal and state governments.
- Air Resources Board (ARB)**—the State of California agency responsible for air pollution control.
- Airshed**—a term denoting a geographical area the whole of which, because of topography, meteorology, and climate, shares the same air (see *Air Basin*).
- Ambient Air**—outside air; any portion of the atmosphere not confined by walls and a roof.
- Aromatic**—an unsaturated organic compound with a ring structure. Example: benzene.
- Asbestos**—a mineral fiber that can pollute air or water and cause cancer or asbestosis when inhaled. EPA has banned or severely restricted its use in manufacturing and construction.

- Association of Bay Area Governments (ABAG)**—a voluntary joint-powers comprehensive regional planning agency for the nine Bay Area counties.
- Asthma**—a medical condition characterized by abnormal restriction of breathing, especially in response to allergens or air contaminants.
- Atmosphere**—the layer of life-giving gases (air) that surrounds the earth.
- Attainment**—a designation used when an area meets an air quality standard.
- Authority to Construct (A/C)**—a pre-construction permit issued by the District.
- Baghouse**—an air pollution abatement device that traps particulates (dust) by forcing gas streams through large permeable bags, usually made of glass fibers.
- Banking**—a provision in District permit regulations where a facility can take credit for reducing emissions beyond regulatory limits and use that credit at a later date. Similar to a savings account that does not pay interest.
- Bay Area '91 Clean Air Plan**—the planning document produced by the District intended to incorporate all feasible measures for the reduction of ozone and carbon monoxide air pollution in the Bay Area as mandated by the California Clean Air Act.
- Best Available Control Technology (BACT)**—an emission limitation based on the maximum degree of emission reduction which is achievable through application of production processes and available methods, systems, and techniques.
- British Thermal Unit (BTU)**—a unit of heat used to describe the capacity of boilers and furnaces. One BTU equals the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at sea level.
- California Clean Air Act (CCAA)**—legislation enacted in 1988 mandating a planning process to attain state ambient air quality standards.
- Cal - EPA**—the state agency created in 1991 to oversee the various state environmental agencies.
- Carbon Dioxide (CO₂)**—a colorless, odorless, non-poisonous gas, which results from fossil fuel combustion and is normally a part of the ambient air.
- Carbon Monoxide (CO)**—a colorless, odorless, toxic gas produced by the incomplete combustion of carbon-containing substances. One of the major air pollutants, it is emitted in large quantities by exhaust of gasoline-powered vehicles.
- Carcinogen**—any substance that can cause or contribute to the production of cancer.
- Catalytic Converter**—an air pollution abatement device used primarily on motor vehicles. It removes organic contaminants by oxidizing them into carbon dioxide and water through chemical reaction. May convert nitrogen dioxide to nitrogen and oxygen, as well as promoting other similar reactions.
- Chlorofluorocarbons (CFCs)**—a family of inert, nontoxic, and easily liquified chemicals used in refrigeration, air conditioning, packaging, insulation, or as solvents and aerosol propellants. Because CFCs are not destroyed in the lower atmosphere they drift into the upper atmosphere where their chlorine components destroy ozone.
- Chronic**—marked by long duration or frequent recurrence, as a chronic disease.
- Clean Air Act (CAA)**—long-standing federal legislation that is the legal basis for the national clean air programs, last amended in 1990 (see *California Clean Air Act*).
- Coefficient of Haze (COH)**—a measurement of the quantity of dust and smoke in the atmosphere in a theoretical 1000 linear feet of air. A COH of less than 1 is considered clean air and more than 3 is considered dirty air.
- Combustion**—burning, that is, the production of heat and light energy through chemical change—usually oxidation of hydrocarbon fuel.
- Continuous Emission Monitor (CEM)**—a type of air emission monitoring device installed to operate continuously inside of smoke stacks.

Criteria Air Pollutants—as required by the 1970 amendments to the Clean Air Act, the EPA identified and set standards to protect human health and welfare for six pollutants: ozone, carbon monoxide, total suspended particulates, sulfur dioxide, lead, and nitrogen oxide. The total suspended particulate standard has since been changed to a more health-oriented PM_{10} standard. The term “criteria pollutants” derives from the requirement that the EPA must describe the characteristics and potential health and welfare effects of these pollutants. It is on the basis of these criteria that standards are set or revised.

Cyclone—an air pollution abatement device that removes heavy particles from an air stream through centrifugal force.

Degreaser—equipment which removes grease, dirt or unwanted materials from any part or product. Degreasers typically use solvents, as liquid baths or condensing vapors, to remove such material.

Dew Point—the temperature at which droplets of water condense from air (dependent on the prevailing humidity).

Diesel Engine—a type of internal-combustion engine that uses low-volatility petroleum fuel and fuel injectors, and produces combustion temperatures by compression (as opposed to spark ignition).

Dust—solid particulate matter that can become airborne.

Ecology—the interrelationship of organisms and their environment, and the science that is concerned with that interrelationship.

Electrostatic Precipitator—an air pollution abatement device that removes particulate matter from a gas stream by imparting an electrical charge to the particles for mechanical collection on an electrode.

Emission Factor—the amount of a specific pollutant emitted from a specified polluting source per unit quantity of material handled, processed, or burned. For example, the emission factor for oxides of nitrogen from fuel oil combustion in an industrial boiler is 80 pounds per 1,000 gallons of fuel oil used. By using the emission factor of a pollutant and specific data regarding quantities of material used by a given source, it is possible to compute emissions for the source. This approach is used in preparing an emissions inventory.

Emission Inventory—a list of air pollutants emitted into a community’s atmosphere, in amounts (commonly tons) per day or year, by type of source.

Emission Standard—the maximum amount of pollutant that is by regulation permitted to be discharged from a polluting source - for example, the number of pounds of dust that may be emitted per hour from an industrial process.

Environment—the aggregate of all the external conditions and influences affecting the life, development, and ultimately the survival of an organism. More commonly, the earth’s crust, water resources, life forms, and atmosphere.

Environmental Protection Agency (EPA)—the federal agency responsible for control of air and water pollution, toxic substances, solid waste, and cleanup of contaminated sites.

Equivalent Opacity—the application of the Ringelmann system to the evaluation of the density of other than black smoke (see *Ringelmann*).

Ethanol—ethyl alcohol, a volatile alcohol containing two carbons (CH_3CH_2OH). For fuel use, it would be produced by fermentation of corn or other plant products, with any water being distilled away.

Evaporation—the physical transformation of a liquid to a gas at any temperature below its boiling point.

Exceedance—a violation of environmental protection standards by exceeding allowable limits or concentration levels.

Flexible Fuel Vehicle—vehicles that can use either alcohol fuels (methanol or ethanol) or unleaded gasoline, or any combination of the two.

Fluorocarbon—an organic compound that contains fluorine. Some of these compounds may affect health but they are not smog forming (non-reactive).

Fossil Fuels—coal, oil, and natural gas; so-called because they are the remains of ancient plant and animal life.

Fume—solid particles under 1 micron in diameter, formed as vapors condense or as chemical reactions take place.

Furnace—a combustion chamber; an enclosed structure in which fuel is burned to heat air or material.

Greenhouse Effect—the warming of the earth's atmosphere caused by a build-up of carbon dioxide and other trace gases. This build-up allows light from the sun's rays to heat the earth but prevents a counterbalancing loss of heat.

Ground Level Monitor (GLM)—a type of air pollution monitoring device located around major industrial facilities to measure ambient levels of certain pollutants.

Halogen—a family of chemical elements that includes fluorine, chlorine, bromine, and iodine.

Halogenated Organic Compounds—organic compounds containing one or more atoms of a halogen. These compounds tend to be stable and non-reactive.

Hazardous Air Pollutants—air pollutants which are not covered by ambient air quality standards but which may reasonably be expected to cause or contribute to irreversible illness or death.

Health Risk—the probability that exposure to a given set of toxic air contaminants will result in an adverse health effect. The health risk is affected by several factors: the amount and toxicity of emissions, the weather, distance from sources to people, the distance between sources, the age, health and lifestyle of the people living and working at the receptor location. The term "risk" usually refers to the increased chance of contracting cancer as a result of an exposure, and is expressed as a probability: chances-in-a-million.

Health Risk Assessment—a document that identifies the risks and quantities of possible adverse health effects which may result from exposure to emissions of toxic air contaminants. A health risk assessment cannot predict specific health effects; it only describes the increased possibility of adverse health effects, based on the best scientific information available.

"Hot Spot"—a location where emissions from specific sources may expose individuals and population groups to elevated risks of adverse health effects, including but not limited to cancer, and contribute to the cumulative health risks of emissions from other sources in the area.

Hydrocarbon—any of a vast number of compounds containing carbon and hydrogen in various combinations; found especially in fossil fuels. Some of the hydrocarbon compounds are major air pollutants; they may be active participants in the photochemical process or affect health.

Hydrogen Sulfide (H₂S)—a gas characterized by "rotten egg" smell, found in the vicinity of oil refineries, chemical plants and sewage treatment plants.

Incineration—the burning of household or industrial waste in a combustion chamber designed for the purpose.

Inert Gas—a gas such as helium, neon, or argon that does not react with other substances under ordinary conditions.

Inorganic Gaseous Pollutant—a gaseous pollutant that is not an organic compound. Examples are: sulfur dioxide, hydrogen sulfide and nitrogen oxides.

Internal Combustion Engine (ICE)—an engine in which both the heat energy and the ensuing mechanical energy are produced inside the engine.

Inversion—the phenomenon of a layer of warm air pressing down on cooler air below it. A special problem in polluted areas because this atmospheric structure resists the natural dispersion and dilution of air contaminants.

LAER—lowest achievable emission rate.

Manual of Procedures (MOP)—a manual of District source testing, laboratory and enforcement procedures used by the staff and industry to determine whether industries are meeting the regulations.

Methanol—a single carbon alcohol, generally produced from natural gas (methane).

Metropolitan Transportation Commission (MTC)—the local agency that provides comprehensive regional transportation planning for the Bay Area and distributes federal and state transportation assistance funds.

Micro—a prefix meaning 1/1,000,000 abbreviated by the Greek letter μ .

Micron—a unit of length equal to one thousandth of a millimeter or about 1/25,000 of an inch.

Milli—a prefix meaning 1/1,000.

Mist—liquid particles up to 100 microns in diameter.

Mixing Depth—the expanse in which air rises from the earth and mixes with the air above it until it meets air equal or warmer in temperature.

Mobile Source—a moving source of air pollution, mainly forms of transportation such as cars, trucks, motorcycles, and airplanes.

National Ambient Air Quality Standards (NAAQS)—health-based pollutant concentration limits established by EPA that apply to outside air (see *Criteria Pollutants*).

National Emissions Standards for Hazardous Air Pollutants (NESHAPS)—emissions standards set by EPA for air pollutants not covered by NAAQS that may cause an increase in deaths or in serious, irreversible, or incapacitating illness.

New Source Performance Standards (NSPS)—pollutant emission limits for newly constructed sources; defined in Regulation 10.

New Source Review (NSR)—a permitting procedure for new or modified stationary sources; found in Regulation 2.

Nitric Oxide (NO)—precursor of ozone, NO₂, and nitrate; usually emitted from combustion processes. Converted to nitrogen dioxide (NO₂) in the atmosphere, it then becomes involved in the photochemical process and/or particulate formation.

Nitrogen Oxides (NOx)—gases formed in great part from atmospheric nitrogen and oxygen when combustion takes place under conditions of high temperature and high pressure; considered a major air pollutant.

Nonattainment Area—defined geographic area that does not meet one or more of the state or federal air quality standards for the criteria pollutant.

Open Burning—the uncontrolled burning of waste materials in the open, in outdoor incinerators, or in an open dump either intentionally or accidentally.

Organic Compounds—large group of chemical compounds that contain carbon. All living organisms are made up of organic compounds. Some types of organic gases, including olefins, substituted aromatics and aldehydes, are highly reactive—that is, participate in photochemical reactions in the atmosphere to form oxidant. Standards to control organic compounds are found in Regulation 8.

Oxidant—air pollutants containing oxygen that can react chemically with other substances. Oxidant is mostly ozone, plus small quantities of nitrogen compounds.

Ozone (O_3)—a pungent, colorless, toxic gas. As a product of the photochemical process, it is a major air pollutant.

Ozone Depletion—destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation. This destruction is caused by the breakdown of certain chlorine and/or bromine-containing compounds (chlorofluorocarbons or halons) which catalytically destroy ozone molecules in the stratosphere.

Particulate—a particle of solid or liquid matter; soot, dust, aerosols, fumes and mists.

Parts Per Million (PPM)—the number of parts of a given pollutant in a million parts of air.

Permit to Operate (P/O)—an operational permit issued yearly by the District to sources that meet District regulations.

Photochemical Process—the chemical changes brought about by the radiant energy of the sun acting upon various polluting substances. The products are known as photochemical smog.

Plume—a visible or measurable discharge of a contaminant from a given point of origin. Can be visible or thermal in water or air as, for example, a plume of smoke.

PM₁₀—fine particulate matter (solid or liquid) with an aerodynamic diameter equal to or less than 10 microns. Individual particles of this size are not visible.

Pollution Standards Index (PSI)—a system developed by the federal government for reporting air pollution concentrations to the public as numerical values in relation to conditions of health.

Precipitators—any of a number of devices using mechanical, electrical, or chemical means to collect particulates. Used for measurement, analysis, or control.

Precursor—compounds that change chemically or physically after being emitted into the air and eventually produce air pollutants. For example, organic compounds are precursors for ozone.

Prevention of Significant Deterioration (PSD)—EPA program in which state and/or federal permits are required to restrict emissions in areas that meet federal standards for criteria pollutants.

Radon—a colorless, naturally occurring, radioactive, inert gaseous element formed by radioactive decay of radium atoms in soil or rocks.

Reactive Organic Gases (ROG)—classes of organic compounds, especially olefins, substituted aromatics and aldehydes, that react more rapidly in the atmosphere to form photochemical smog or ozone.

Reasonable Further Progress (RFP)—specified rate of progress towards meeting an air quality standard, as set forth in law or plan.

Reasonably Available Control Technology (RACT)—air pollution abatement equipment that is both technologically feasible and cost effective.

Ringelmann Chart—actually a series of charts, numbered 0 to 5, that simulate various smoke densities, by presenting different percentages of black. A Ringelmann No. 1 is equivalent to 20 percent black; a Ringelmann No. 5 is 100 percent. They are used for measuring the opacity or equivalent obscuration of smoke arising from stacks and other sources, by matching with the actual effluent the various numbers, or densities, indicated by the charts.

Saturated Hydrocarbon—an organic compound without double bonds in the molecule. Examples are ethane, methane and propane. They are relatively unreactive.

Scrubber—a device that uses a high energy liquid spray to remove aerosol and gaseous pollutants from an air stream. The gases are removed either by absorption or chemical reaction.

- Smog**—a term used to describe many air pollution problems, it is a contraction of smoke and fog; in California, it describes the irritating stagnant haze resulting from the sun's effect on pollutants in the air.
- Soot**—very fine carbon particles that appear black when visible.
- State Implementation Plan (SIP)**—EPA-approved state plans for the establishment, regulation, and enforcement of air pollution standards.
- Stationary Source**—a fixed, non-mobile producer of pollution, usually at industrial or commercial facilities.
- Stratosphere**—the portion of the atmosphere that is 10-25 miles above the earth's surface.
- Sulfur Oxides**—pungent, colorless gases formed primarily by the combustion of sulfur-containing fossil fuels, especially coal and oil. Considered major air pollutants, sulfur oxides may damage vegetation as well as the respiratory tract.
- Topography**—the configuration of a surface, especially the earth's surface, including its relief and the position of its natural and man-made features.
- Total Organic Gases (TOG)**—gaseous organic compounds, including reactive organic gases and relatively unreactive organic gases, such as methane.
- Total Suspended Particulates (TSP)**—particles of solid or liquid matter - soot, dust, aerosols, fumes and mist - up to approximately 30 microns in size.
- Toxic Air Pollutants**—air pollutants which cause illness or death in relatively small quantities. Non-criteria air contaminants that, upon exposure, ingestion, inhalation, or assimilation into organisms either directly from the environment or indirectly by ingestion through food chains, will cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, or physical deformations in such organisms or their offspring.
- Transportation Control Measures (TCMs)**—measures to reduce congestion and decrease emissions from motor vehicles by reducing vehicle use.
- Troposphere**—the layer of the atmosphere nearest the earth's surface. The troposphere extends outward about 5 miles at the poles and 10 miles at the equator.
- Underground Storage Tank**—a tank located all or partially under ground that is designed to hold gasoline or other petroleum products or chemical solutions.
- Variance**—permission granted for a limited time under stated conditions for a person or company to operate outside the limits prescribed in a regulation.
- Volatile Organic Compound (VOC)**—an organic compound that evaporates readily at atmospheric temperatures.
- Woodburning Pollution**—air pollution caused by emissions of particulate matter, carbon monoxide, and odorous and toxic substances from wood-burning stoves and fireplaces.

BAAQMD TELEPHONE DIRECTORY

Main District Office -----	(415) 771-6000
Air Pollution Control Officer -----	(415) 749-4970
Clerk of the Boards -----	(415) 749-4975
Compliance Assistance -----	(415) 749-4999
Legal -----	(415) 749-4920
Enforcement Services -----	(415) 749-4795
FAX -----	(415) 928-8560
Permit Services -----	(415) 749-4990
Personnel -----	(415) 749-4980
Planning & Research -----	(415) 749-4995
Public Information & Education -----	(415) 749-4900
Technical Services -----	(415) 749-4985

Air Pollution Complaints -----	1 (800) 334-ODOR
Daily Air Quality Readings	
Written Information on Air Quality	
Burn-No Burn Status	
Marine Loading -----	1 (800) HELP AIR
Smoking Vehicle Complaints -----	1 (800) EXHAUST

OTHER AGENCIES

Air Resources Board -----	(916) 322-2990
Air Resources Board Information -----	1 (800) 952-5588
DOHS Indoor Air Quality -----	(510) 540-2469
Environmental Protection Agency, Region 9----	(415) 744-1500
Metropolitan Transportation Commission -----	(510) 464-7700
Northern Sonoma APCD -----	(707) 433-5911
Regional Water Quality Control Board -----	(510) 286-1255
Yolo-Solano APCD -----	(916) 757-3650

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